

PLANNING AND DESIGN CRITERIA TO MAKE URBAN TRANSPORT MORE
SUSTAINABLE: THE CASE OF BAKU

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SUSTAINABLE: THE CASE OF BAKU**

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ABSTRACT

PLANNING AND DESIGN CRITERIA TO MAKE URBAN TRANSPORT MORE SUSTAINABLE: THE CASE OF BAKU

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Since the industrial revolution, technological developments and increased population have caused environmental damages such as lavish use of sources, pollution increased waste areas, poisoned wastes, harmless gasses, decreased green areas, global warming and climate change, harming of the ozone layer, decreased forests areas and natural sources.

Appearance of the term of Global Warming makes the humanity to revise their facilities in all fields. To protect the nature and architectural environment, firstly, green architecture, ecological architecture and then sustainability occurred. This term has been proposed not to be a new term but a response to environmental disturbances caused by human activities and it is re-conceptualization of architecture. Sustainable architecture or sustainability is lot more extensive than ecological and green architecture. It contains the imbalance between environmental problems which is natural environment and consumption that occurred all around the world.

An important part of sustainability debate focused on urban planning and design for more sustainable forms and patterns. In particular it is discussed that planning

and design of urban areas have a major effect on transport and therefore can help reduce car usage, emissions, global warming and climate change. There are many planning and design approaches and movement that introduce certain criteria and strategies to prevent car dependency and encourage people to use public transportation and walking. To achieve sustainable transport, there should be design for walkable and easy accessible areas. Planning movements, such as New Urbanism and Transit Oriented Development, particularly came to the forefront of planning and influenced planning approaches.

However, when review the literature, it is seen that planning movements, such as New Urbanism and Transit Oriented Development originated and were implemented mostly in West European and North American Cities. The purpose of this study is to find out whether all those criteria, principles and strategies are also relevant planning approaches for more non-western cities like Baku which has a very different planning background and therefore possibly different urban form and transport issues. In order to answer the abovementioned question, planning and design approaches in the literature and in these recent planning movements were studied and a check list was formed which indicate planning and design approaches that can help attain a more sustainable transport outcome. The checklist was then applied to the case of Baku.

Keywords: Sustainability, Sustainable Development, Sustainable Transportation

ÖZ

KENTSEL ULAŞIMI DAHA SÜRDÜRÜLEBİLİR YAPMAK İÇİN PLANLAMA VE TASARIM ÖLÇÜTLERİ: BAKÜ ÖRNEĞİ

Bayramoğlu, Gülnar

Yüksek Lisans, Şehir ve Bölge Planlama Bölümü, Kentsel Tasarım

Tez Yöneticisi: Assoc. Prof. Dr. Ela Babalık Sutcliffe

Eylül 2011, 137 sayfa

Endüstri devriminden bu yana sayısız teknolojik gelişmeler ve nüfus artışı savurganca kaynak kullanımına, bunun sonucu olarak da kirlilik, artan çöplük alanlar, zehirli atıklar, zararlı gazlar, azalan yeşil alanlar, küresel ısınma, iklim değişikliği, ozon tabakasının zarar görmesi, ormanların ve doğal kaynakların giderek azalması gibi çevresel felaketlerin oluşumuna sebep olmuştur.

Küresel ısınma kavramının ortaya çıkması insanların her alandaki faaliyetlerini gözden geçirmesini sağlamıştır. Doğal ve yapıli çevre arasındaki dengeyi korumaya yönelik önceleri yeşil tasarım, ekolojik mimarlık ve bunların devamında gelişen sürdürülebilir mimarlık ortaya çıkmıştır. Bu kavram aslında yeni bir kavram olarak değil, insan faaliyetlerinin sebep olduğu çevresel bozulmalara tepki olarak ortaya atılmıştır ve mimarlığın yeniden kavramsallaştırılmasıdır. Sürdürülebilir mimarlık (ve aslında sürdürülebilirlik), ekolojik ve yeşil mimarlığın aksine çok daha geniş kapsamlıdır. Dünyanın birçok bölgesinde ortaya çıkan bu çevre sorunları başta kaynak tüketimi ve doğal çevre arasındaki dengesizliği içermektedir.

Dünyayı, çevresel, ekonomik ve sosyal yönden etkileyen en büyük faktor şehirler, şehirleşmeler oluşu için sürdürülebilirlik, sürdürülebilir şehir, kent kavramını ortaya çıkarmıştır. Bunun kapsamı içinde bir çok planlama ve tasarım kriterleri ve

stratejileri yer almaktadır. Bütün bu stratejilere bakıldığında, aslında hepsinin daha az araba kullanımına yönelik, toplu taşıma araçlarını teşvik edici ve insanları yürümeye, bisiklete binmeye özendirici faktörlerin olduğu görülür. Bunun sonucunda ortaya çıkan bir başka kavram da ulaşımın sürdürülebilirliğidir. Ulaşımın sürdürülebilir olması için kent planlama ve tasarım ile yürünebilir ve toplu taşıma kullanılarak kolay erişilebilir mekanlar yaratılması gerekir. Bu doğrultuda yeni şehircilik (New Urbanism), toplu taşıma odaklı gelişim (transit-oriented development) gibi akımlar ön plana çıkmış, planlama yaklaşımlarını etkilemiştir.

Fakat literatüre bıldığında aslında bütün bu kavramların ve anılan akımların Batı Avrupa ve Kuzey Amerika ülkelerinde ortaya çıktığı ve tartışıldığı görölmektedir. Bu tez çalışmasındaki amaç, bütün bu tasarım ve planlama kriterlerinin Azerbaycan gibi daha “çeperdeki” ülkelerde de geçerli olup olmadığının belirlenmesidir. Bunun için de çok farklı bir planlama geçmişı olan Bakü şehrinin uygun örnek oluşturduğu öngörölmüştür. Yazında anılan planlama tasarım yaklaşımları ile çeşitli akımlar incelenerek planlama, tasarım ve kent formuna ilişkin olarak sürdürülebilir ulaşımı destekleyen yaklaşımları biraraya getiren bir kriterler listesi oluşturulmuş ve Bakü kenti bu çerçevede incelenmiştir.

Anahtar Kelimeler: Sürdürülebilirlik, Sürdürülebilir Gelişim, Sürdürülebilir Ulaşım

To My Whole Family...

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CHAPTER 1

INTRODUCTION

There is a vast literature about sustainability, sustainable development and sustainable transportation. All those issues have an impact on urban form and design. There are several planning and neighborhood design movements today that have their own strategies and principles. Although they have different names, such as new urbanism, smart growth, transit village, urban village, transit oriented design, pedestrian friendly design, etc.; all those studies have a common idea that is the creation of a more sustainable urban area, particularly through the creation of a sustainable urban transport system that is not car-dependent. While all those movements have their own strategies, they actually have many common sides. The first aim of this study is to bring all those common principles in one approach to set up a framework that consists of urban planning and design principles for sustainable urban transport.

The other common feature of those movements is that they all studied and were developed based on the West European and North American cities. This situation brings the question of whether all those principles are universal or not. In other words it should be clarified whether these approaches and principles can also be valid planning tools for cities in “non-western” countries, such as those in developing country cities in Asia. The second aim of this study is therefore about this question. With respect to that hypothesis, in this thesis three main questions are tried to be answered;

- What are the key elements to make urban areas sustainable?
- What are the planning and design principles to make urban transportation more sustainable?

- Can those principles be a framework for all the countries in the world (can those principles be considered as universal)?

In order to attain the main aim and to answer the main research questions some objectives and further research questions were identified. For this purpose, Baku was selected as a case study because it has a different planning background because of its Soviet history, which is much different than Europe and North America. Baku urban planning has never been analyzed after the independency of the Azerbaijan although it has a very consuming planning history at the beginning of the 19th century. In fact Baku did not produce a Master Plan after the 1987 plan. This brings the question of whether they continue to apply the principles of the old urban plan strategies, whether this old planning strategy include the sustainable urban design principles or not. The research question specific to Baku is whether planning and design principles for creating more sustainable transport outcomes can be a valid and useful guideline for planning in Baku or whether the specific planning background and resulting urban and transport structure in Baku make these design guidelines inapplicable or unnecessary in this city's context. These two basic questions make Baku an appropriate case study for this thesis in the concept of sustainable urban development principles.

This study is composed of three parts; the first part (Chapter 2) draws a theoretical framework of the sustainability, sustainable development and sustainable transportation. The part also aims to determine the main principles of sustainable urban design. The second part (Chapter 4) gives the information about the Baku Urban Planning History to understand the problems and issues of planning system of the City. The third part (Chapter 5) is the Macro, Mezzo and Micro analysis of Baku to expose whether all those determined principles are also valid issues for the non-western cities like Baku. The content of each chapter are presented below.

In Chapter 2, with a literature review, sustainable development and sustainable transportation is examined in detail. In this chapter the main principles to make

urban more sustainable, particularly from the point of view of urban transport, are tried to be determined and listed. To make the study more practical, three case studies are selected from Europe and North America which applied these sustainable urban design principles.

Chapter 3 introduces the theoretical framework and the methodology of the study which has been developed based on the literature review. The hypothesis, aims and the objectives, the main question of the thesis, research method, the case study selection and the method of analysis are presented.

In Chapter 4, Baku urban planning history are described based on the books named 'Baku Urban Planning Between 19th And The Beginning Of 20th Centuries' published in 1986 that written by the Architecture and Urban Planner in Azerbaijan, Ş.S. Fetullayev and 'Architecture of the Soviet Azerbaijan' published in 1986 by the architect Efendizade, R. M.

In Chapter 5, Baku is being analyzed based on the sustainability concept and criteria that were reviewed in Chapter 2. With respect to this analysis, interviews were made with urban planners and academicians in Baku. Besides, site analysis was made with making sketches and taking photographs around three main regions selected.

Chapter 6 summarizes the main findings of the study and discuss the question that whether these sustainable urban and transport design principles is valid for a city that is not a mainstream like Baku.

CHAPTER 2

LITERATURE REVIEW

2.1. THE CONCEPT OF SUSTAINABILITY

Sustainability simply means in the global context the development that should improve economically and socially without harming environment. It is related with many disciplines and professions which has therefore developed many complexities (Newman & Kenworthy, 1999, p. 1).

From the pre-industrial revolution to the present, humans attend to change their environment with tools of their time period. As a result, disruption of natural resources becomes one of the two great environmental problems caused by humans. Air pollution, the second problem, occurred due to the wastes of humans which have been a threat to drinking water for many thousands of years. After the industrial revolution, as a result of technological and economic developments environmental impacts began to grow up such as greenhouse effect and air and water pollution. Through the 20th century people get aware of those problems and as first step, in 1971, Canada creates a Department of the Environment. After a year, Stockholm Conference on the Environment attracts the attention of the world to the environmental issues. The Stockholm conference is seen as the start of major global meetings on environment and development (Sustainability Report, 2011).

Sustainability is not only related with the environmental concern. One part of the world that is not economically was not happy with that environmental globalism. As a result the new agenda turning to another debate which is economic development (Newman & Kenworthy, 1999, pp. 1-2)

Pirage's (1977) discussed in his design for a sustainable society the concept of sustainable growth which means the economic growth that can be supported by physical and social environments (Brown, Hanson, Liverman, & Merideth, 1987)

As a result, World Commission on Environment and Development was established by the UN in 1983 to further tackle this basic problem. After 4 years the commission published the Brundtland Report, in other words, 'Our Common Future' which discussed the phase 'Sustainable Development' (Newman & Kenworthy, 1999, p. 4). This is described in more detail in the following section.

2.2. THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Global Sustainability was widely recognized by world leaders as a problem at the start of the 21st century. It became a discussion topic for journalists, scientists, teachers, students and citizens in many parts of the world.

The word 'Sustainable Development' was accepted in the political arena after the publication of the report 'Our Common Future', commonly known as Brundtland Report, in 1987 of World Commission on Environment and Development (WCED). It was chaired by Prime Minister of Norway Gro Harlem Brundtland thus gained the name of Brundtland.

It was with the 1972 Stockholm Conference on the Human Environment where the first arguments between environment and development were affirmed and World Conservation Strategy of the International Union for the Conservation of Nature. Depending on these, Brundtland Commission began its works on unity of environment and development. The major international meetings followed those reports. The United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro also published a statement in 1992 (Robert, Parris, & Leiserowitz, 2005, pp. 8-21).

In 1999, the Amsterdam Treaty put the Sustainable Development as a core task of the European Union. In June 2001, the Gothenburg European Council regarded the Commission's Sustainable Development Strategy (Sustainability Report, 2002). After a year at the World Summit on Sustainable Development in Johannesburg, South

Africa, the issue of Sustainable Development was re-affirmed (Robert, Parris, & Leiserowitz, 2005, pp. 8-21)

There are lots of definitions in many ways about Sustainable Development but the most noted definition is from the Brundtland Report. The Report mentioned Sustainable Development in Chapter 2, titled Towards Sustainable Development and defined it as;

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'

According to the Brundtland report, Sustainable Development contains within it two key concepts (Brundtland Report, 1987):

- The concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given;
- The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Sustainability is related with compromising the long term development of human society with the finite limits of the planet. The classical definition of the Brundtland Report reflects this wide concept. World system can be considered as a socio-ecological system (Figure 1) enclose the environmental and human sub-system and their interaction (Gallopín & Raskin, 2002, pp. 4-6)

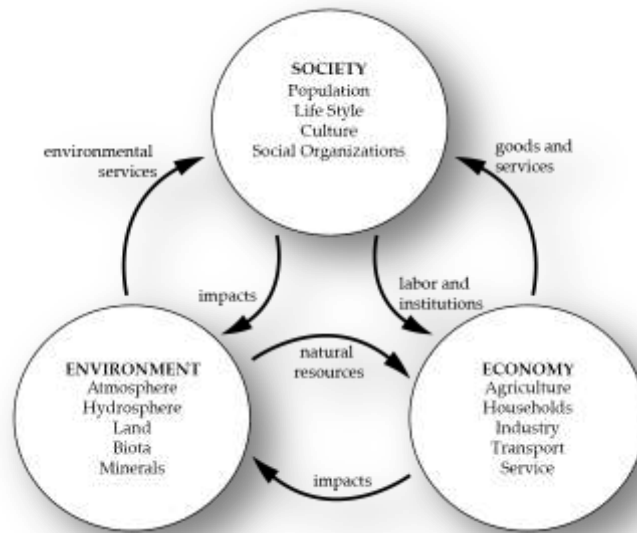


Figure 1: The Socio-Ecological System (Gallopín & Raskin, 2002, pp. 4-6)

The concept of sustainability has appeared through a global political process that has tried to bring together the most powerful three needs of our time (Newman & Kenworthy, 1999, p. 4)

- Need for economic development to overcome poverty
- Need for environmental protection of air, water, soil and biodiversity upon which we all ultimately depend
- Need for social justice and cultural diversity to enable local communities to express their values in solving these issues

Kenworthy and Newman mentioned that when we refer to sustainable development, we simply mean achievement of global environmental gains along with any economic or social development (Figure 2).

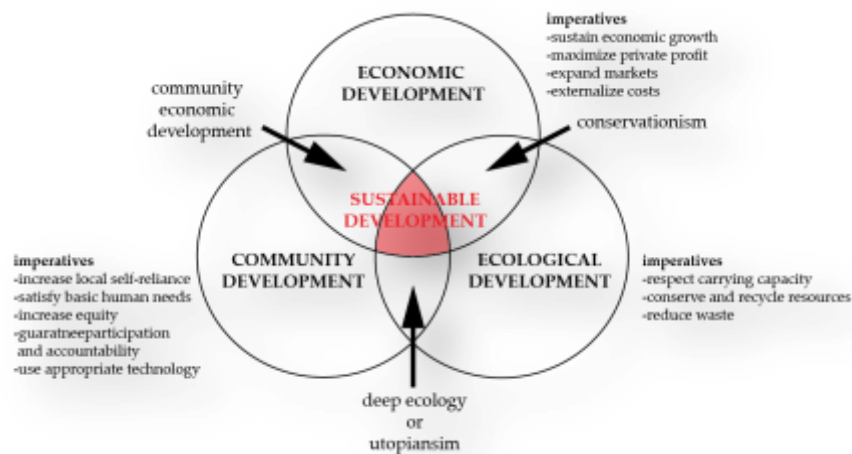


Figure 2: There are always three distinct development processes underway at local level; economic development, community development and ecological development. Each of these processes has its own distinct imperatives. (Newman & Kenworthy, 1999, p. 4)

When we ask under the heading 'what is to be sustained' there are three major categories identified; nature, life support systems and community which has the intermediate categories of each such as earth, environment and cultures. The question of 'what should be developed' has again three ideas which are; people, economy and society (Robert, Parris, & Leiserowitz, 2005, pp. 8-21). All those instructions conclude of the same three pillars of the Sustainable Development which are economically, socially and environmentally sustainable developments (Figure 3).



Figure 3: Three Pillars of Sustainability

However, when the focus in sustainable development shifted away from nation-states to cities-towns, the local sustainability agenda and the global sustainability agenda start to make more sense. Newman and Kenworthy (1999) claim that the major environmental battles of the past were fought outside the cities, but that an awareness of the need to come back to cities is now universally recognized by environmentalists, governments and industry. Many organizations and developments such as The Organization of Economic and Cultural Development, The European Community and even the World Bank, now have sustainable cities program (Newman & Kenworthy, 1999, p. 6). As Yanarella & Levine (1992) suggest, 'cities shape the world and we will never begin the sustainability process unless we can relate it to cities'

Indeed, in this thesis, sustainable development is going to be analyzed in an urban approach.

2.3. URBAN DESIGN AND SUSTAINABILITY

As Kevin Lynch mentioned in his book of Image of the City, looking at cities can give a special pleasure. It can be seen like a piece of architecture but one of immense scale and the city is a construction in space (Lynch, 1960).

The physical form of a city has an effect on the human activities. We are faced with many design issues while making decisions as to how to build, enlarge, or renew the urban. There are many written principal criteria; however, while concentrating on the visual quality of the region, Lynch suggested models have the following features (Banerjee & Southworth, 1991, p. 35)

- Accessibility: low cost of movement or communication between activity locations
- Adequacy: sufficient quality and quantity of such basic facilities as houses, schools, roads, recreation areas, shopping, offices and factories

- Diversity: a wide range of variation of facilities and activities, these varieties being rather finely mixed in space
- Adaptability: low cost of adaptation to new functions, and the ability to absorb sudden shock
- Comfort: an environment which does not place undue stress on the individual, particularly in regard to communication, climate, noise, and population

On the other hand, Lynch's classification of the physical form of the city covered five types of elements which are (Lynch, 1960, p. 46).

- Paths; the most predominant paths are; streets, walkways, transit lines, canals, railroads. People observe the city while moving through it and along these paths other environmental elements are arranged and related.
- Edges; linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls.
- Districts; are the medium to large section of the city, conceived of as having two dimensional extent which the observer mentally enters inside of and which are recognizable as having some common, identifying character.
- Nodes; are the points, the strategic spots in a city into which an observer can enter. They may be a primarily junctions, places of a break in transportation, a crossing or convergence of paths, street corner hangout, enclosed square.
- Landmarks; type of point reference, but this time observer does not enter within them, they are external. Simply defined physical objects; buildings, signs, store or a mountain.

At the end the definite elements for the city design are determined as below and designer should pay attention to the background on which these elements are set forth; the visible character, diversity, and mix of the district (Banerjee & Southworth, 1991, p. 69)

- The major path system, the streets, rail lines, canals, promenades, airways. The relation of these paths to the major centers, open areas, natural features, and special use district.
- The major centers, focal points and nodes: the peaks of the density, special activity, or access, such as shopping centers and major terminals. The plan should be concerned with the location of these districts, their relation to each other, and the path system, to the natural features, their sense of local connection or of contrast with their surroundings.
- Special districts: areas of appreciable size associated with memorable activities, character or associations. In particular these include the large special institutions (hospitals and universities), ports and the regions of heavy industry, principle office districts, the major open spaces or recreation zones, and the special historical areas. The plan should be concerned with the location of these districts, their visibility and accessibility from the path system, and their visual character (in terms of such dimensions the silhouette, landscaping, climate and noise)

However, these are all related with the urban design but its relation with the sustainability should be discussed.

The urban regions are the first step to thinking about sustainable urban structure. Ritchie and Thomas (2009) explained the meaning of sustainable planning as it is more holistic and integrated approach in the urban region. The concept has a multicentre urban structure, which a town or city composed of different network but overlapping communities. Besides, each focused on a town, district local centers and each people can access on foot to most of the facilities and services that they need for daily living (Ritchie & Thomas, 2009, pp. 12-13)

Newman and Kenworthy defined indicators for a sustainable city which are (Newman & Kenworthy, 1999, pp. 18-19);

- Energy and Air Quality
 - Reduce total energy use per capita
 - Decrease energy used per dollar of output from industry
 - Increase proportion bridging fuels (natural gas) and renewable fuels (solar, wind , biofuels)
 - Reduce total quantity of air pollutants per capita
 - Reduce total greenhouse gases
 - Achieve zero days not meeting air-quality health standards
 - Reduce fleet average and new vehicle average fuel consumption
 - Reduce number of vehicles failing emission standards
 - Reduce number of households complaining of noise
- Water, Materials and Waste
 - Reduce total water use per capita
 - Achieve zero days not meeting drinking-water-quality standards
 - Increase proportion of sewage and industrial waste discharged to streams or ocean
 - Reduce consumption of building materials per capita
 - Reduce consumption of paper and packaging per capita
 - Decrease amount of solid waste (including increasing recycle rates for all components)
 - Increase amount of organic waste returned to soil and food production
- Land, Green Spaces and Biodiversity
 - Preserve agricultural land and natural landscape at the urban fringe
 - Increase amount of green space in local or regional park per capita, particularly in 'green belt' around city
 - Increase proportion of urban redevelopment to new development
 - Increase number of specially zoned transit-oriented locations
 - Increase density of population and employment in transit-oriented locations

- Transportation
 - Reduce car usage per capita
 - Increase transit, walk/bike and carpooling and increase solar use car
 - Reduce average commute to and from work
 - Increase average speed of transit relative to cars
 - Increase service kilometers/miles of transit relative to road provisions
 - Increase cost recovery on transit from fares
 - Decrease parking spaces per 1000 workers in central business district
 - Increase kilometers/miles of separated cycle ways
- Livability Human Amenities and Health
 - Decrease infant mortality per 1000 births
 - Increase educational attainment
 - Increase local leisure opportunities
 - Decrease transport facilities per 1000 population
 - Decrease crimes per 1000 population
 - Decrease death from urban violence
 - Decrease proportion of substandard housing
 - Increase kilometers/miles of pedestrian friendly streets in city and sub-centers
 - Increase proportion of city/suburbs with urban design guidelines to assist communities in redevelopment
 - Increase proportion of city allowing mixed-use, higher density urban villages

There are many supporting opinions about these sustainable urbanization concepts. For instance; Lund (2003) gives a hypothesis in her study saying that; new urbanism claims that mixed use pedestrian friendly neighborhoods have higher rates of walking and neighboring than single-use, automobile oriented ones. Moreover; Dumreicher (2000) argue that a sustainable city should be compact, dense, diverse, and highly integrated. Jabareen (2006) in his article, also, claims that sustainable

urban form must be a form and scale appropriate to walking, cycling and efficient public transport and must have a compactness that encourages social interaction. All those concepts are related with the placing of amenities within the walking distance of homes which increase pedestrian travel and social interaction among neighborhood residents (Lund, 2003).

2.4. DESIGN APPROACHES FOR SUSTAINABLE URBAN AREA

Automobile usage increased over the 20th century parallel to the growth of income per capita. Both the increase in automobile usage and the division of land use functions caused the low density and fragmented land use development. As a result, a problem occurred as a planning issue known as urban sprawl. Today urban sprawl is a major source of environmental degradation. To solve the problem, many planning concepts have been introduced such as smart growth, transit oriented development and the most popular new urbanism.

2.4.1. NEW URBANISM

New Urbanism makes a debate about the ideas of urbanism that have been evolving in America for over a century. New urbanism is an urban reform movement which is gained fame in the 1990s aims to provide vital, beautiful, just, environmentally being human settlements (Talen, 2005). New Urbanism got attention in 1981 when Seaside which is a resort town was built by DPZ (the design firm of Andres Duany and Elizabeth Plater-Zyberk) (Sander, 2002). It became well-known as an urban reform movement in the 1990s, after the discussions for alternatives to the dispersed and car-dependent suburban developments (Talen, 2005, pp. 186-187).

Yan and Gerrit (2003) state that in 1993 a group of architects found the Congress for the New Urbanism (CNU) and dedicated it to “creating buildings, neighborhoods, and regions that provide a high quality of life for all residents, while protecting the natural environment”. New Urbanists deal with urban sprawl, recreation of communities and improvements in the quality of life. It is the most significant

movement in urban planning and architecture in this century (Yan & Knaap Gerrit, 2003, pp. 213-238).

Some approaches are differing from suburban patterns, such as mixed-use towns and infill development in underdeveloped locations in existing cities. It also motivates more environmentally friendly modes of transport by promoting walkability and transit oriented development. Besides, it considers the social benefits of well-designed public spaces (Talen, 2005, pp. 186-187) and tries to decrease automobile dependence while designing more walkable communities (Sander, 2002, pp. 213-234).

The common problem of current practices is ongoing sprawl. As a result New Urbanism encourages people to slow down, to get to know their neighborhoods and become more connected with their environment (Talen, 2005, pp. 186-187). It replaced the wide cul-de-sac and wider arterials with the gridded networks that calm the flow of the traffic (Talen, 2005, pp. 186-187).

In brief, the principles of new urbanism can be listed as high density, strategically placed open spaces; mixed use neighborhoods; and the most importantly convenient public transit, bicycle paths and pedestrian-friendly street networks (Yan & Knaap Gerrit, 2003, pp. 213-238).

There is vast literature about the principles of New Urbanism as it is described in the Charter of the New Urbanism (1996), and according to that key principles of New Urbanism theory listed the as below (Balula, 2010, pp. 26-28);

- Polycentric metropolitan regions that are composed of cities, towns and neighborhoods with identifiable centers and edges
- Compact development that preserves farmland and environmentally sensitive areas,
- Infill development to revitalize city centers
- Mixed-land use rather than single land use areas

- Transit oriented development
- Interconnected streets
- Friendly to pedestrian
- Often in grid like patterns
- The use of streets, blocks, and well matched building typologies to create coherent urban form
- Well designed and well situated civic buildings and public gathering places
- Discreet placement of garages and parking to avoid auto-dominated landscapes
- High quality parks and conservation lands used to delineate and connect neighborhoods and districts
- Architectural design that shows respect for local history and regional character

2.4.2.SMART GROWTH

Smart growth is an issue based on growth management. It is related with the local, regional, and state plans and legislation. The aim of the smart growth is to promote non-sprawl, compact, transit oriented, walkable land use or new town developments that include neighborhood schools, complete streets and mixed-use housing patterns and require adequate public facilities to be available at the time of development (Freilich & Popowitz, 2010, p. 39).

According to Economic Development Council (2006) if growth and development cannot be managed properly it can affect the community life negatively because of automobile congestion, pollution and sprawl (Iams & Pearl, 2006).

Pearl Kaplan (2006) in his study of economic development and smart growth listed the principles of smart growth as;

- Mix land uses
- Create walkable neighborhoods
- Provide a variety of transportation choices

- Use land efficiently
- Create a range of safe, convenient and affordable housing opportunities and choices
- Foster distinctive, attractive communities with a strong sense of place
- Preserve natural lands, farmland, and critical environmental areas
- Strengthen and direct development toward existing communities
- Make development decisions predictable, fair, and cost-effective
- Encourage community and stakeholder collaboration in development decisions

Economic Development Council (2006) also highlights the relationship between smart growth and economic development in the case of four smart growth strategies;

- Transit oriented development
- Revitalization of commercial corridors
- Targeted area redevelopment and infill
- Creation of arts and entertainment districts

Among these strategies, transit oriented development is another well-known planning and design movement, which is described below.

2.4.3. TRANSIT ORIENTED DEVELOPMENT (TOD)

One of the well known neo-traditional approaches to urban design is the Transit Oriented Development (T.O.D) which evolved into the contemporary movement theory and practice of New Urbanism (Balula, 2010, p. 25).

Transit Oriented Development is about concentrating mixed-use residential or commercial area around the public transport nodes and aims to reduce automobile dependence (Renne, 2005).

State of California in its Statewide TOD Study in 2003 defined T.O.D as (Transit Cooperative Research Program, 2002);

'Transit-oriented Development (TOD) is moderate to higher-density development, located within an easy walk of a major transit stop, generally with a mix of residential, employment and shopping opportunities designed for pedestrians without excluding the auto. TOD can be new construction or redevelopment of one or more buildings whose design and orientation facilitate transit use'

A radius of half a mile (about 800 meters) from a transit station is an average distance for location of the transit zone as it is comfortable walking distance for pedestrians (Holmes & Hemert, 2008). In land use planning and policies the appropriate distances are defined as 5 minute walk or distances of 400 to 600 meters. Besides, Calthorpe defined it as a mixed-use community within an average 2000 foot (approximately 600m) walking distance that showed in Figure 4 to transit stops and centers (Shaoming, 2005).

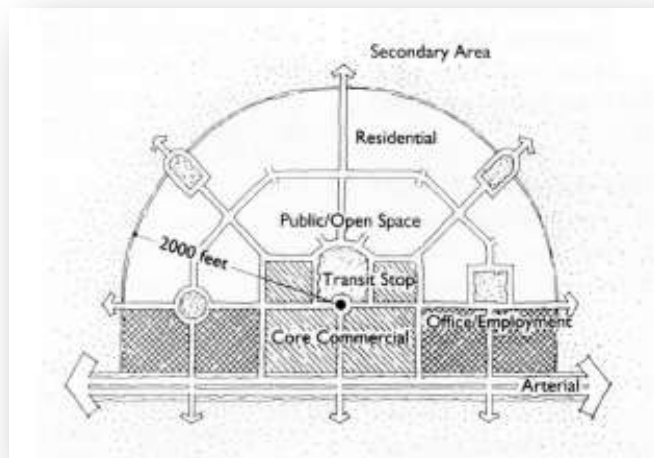


Figure 4: Calthorpe's Diagram of TOD (Shaoming, 2005)

There are many definitions of Transit Oriented Development such as;

- 'Transit oriented development (TOD) is the idea that land near rail transit stations should be developed or redeveloped in ways that encourage the best use of the transit system and that leverage the public investment in rail transit' (Boarnet & Randall, 1995)

- “TOD is a mixed-use community (Figure 5) that encourages people to live near transit services and to decrease their dependence on driving” (Shaoming, 2005)

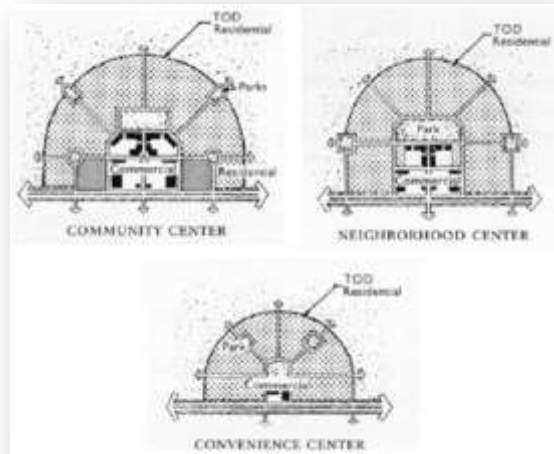


Figure 5: TOD with Different Core Commercial Areas, Sizes and Locations (Shaoming, 2005)

When all the definitions are analyzed there appears to be some common elements for TOD;

- Well served public transportation
- Transportation nodes closed to the neighborhoods and centers
- Pedestrian and environment friendly transportation design; green transportation
- Mixed-use and compact development
- Pedestrian and cycle friendly development

As mentioned before, there is a vast literature about sustainability and designing for sustainable urban areas. Although there are also movements called Transit Villages or Pedestrian-Friendly Design, they appear to be sub-titles of the mainstream movements described above. Therefore, after a review the conclusion is that there are three basic movements to make cities more sustainable: New urbanism, smart growth, and transit oriented development showed in Figure 6;

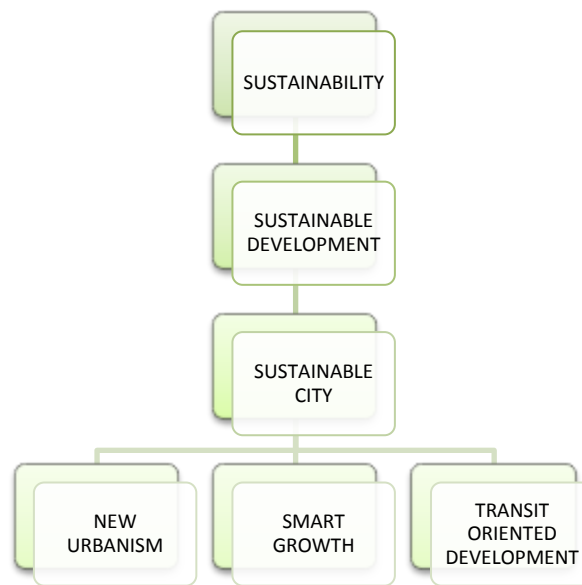


Figure 6: Main Issues to Make Urban More Sustainable

When all these concepts are analyzed basic sustainable urban area planning and design principles can be summarized under four main areas which are, Land Use Management, Transportation, Social Interaction and Environment (Figure 7).

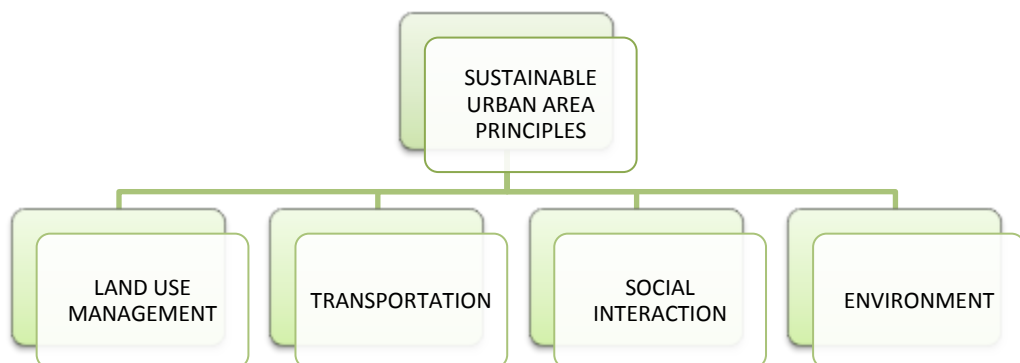


Figure 7: Sustainable Urban Area Principles Relation with Four Pillars

When we relate all the indicators of three main strategies of designing sustainable urban areas with these four main approaches we can draw up the table below;

Table 1: Indicators to Make Urban More Sustainable

INDICATORS To Make Urban More Sustainable	LAND USE MANA-GEMENT	TRANSPORTATION	ENVIRONMENT	SOCIAL INTERACTION
Accessibility	✓	✓		
Diversity	✓			✓
Energy And Air Quality		✓	✓	
Water Management/Efficiency Of Using Water			✓	
Using Of Environmentally Friendly Materials			✓	
Waste Management And Recycling			✓	
Livability Human Amenities And Health	✓			✓
High Density - This Is Also Important In Terms Of Transport Because It Reduces Distances Between Activities	✓	✓		✓
Efficient And Well Served Public Transport	✓	✓	✓	✓
Walkable Communities	✓	✓		✓
Well-Designed Public Spaces – Can Increase Walkability	✓			✓
Bicycle Paths	✓	✓	✓	
Pedestrian Friendly Street Networks	✓	✓	✓	
Compact Development	✓	✓		✓
Mixed Land Use Development – This Is Also Important In Terms Of Transport Because It Reduces Distances Between Activities	✓	✓		
Interconnected Streets	✓	✓		
Grid Like Patterns	✓	✓		
Use Of Streets, Blocks And Well Matched Building Typologies	✓			✓
Non-Sprawl	✓	✓	✓	✓
Use Land Efficiently	✓	✓	✓	
Easy Walk Of Major Transit	✓	✓		
Land Near Rail Transit Stations	✓	✓		

Sustainability is a concept that was discussed after the world war to create livable urban areas. All those discussed urban principles and trends designed to reduce the distances within and between communities. Walking and cycling can be viable options only in reduced distances, while urban sprawl with increased distances results in car-dependent lifestyles. Therefore the purpose is to reduce the travel distances between the daily facilities while saving time, design more green and walkable spaces and present quality of life by reducing traffic and accordingly reduce stress. Besides, to complete the sustainable urban idea, designing sustainable building is also thought. All written and discussed literature about the sustainable urban or city has a common approach which is Land Use Management. Land Use Management became important to succeed social, economical and environmental actions such as closer activities, more accessible centers, time saving from travelling, mixed-use neighborhoods, walkable communities. However; to achieve successful Land Use Management there should be successful transportation system. If an efficient transportation system is not designed, land use management will not properly work. As a result, to achieve a sustainable urban area we should make the transportation infrastructure more sustainable too.

2.5. SUSTAINABLE TRANSPORTATION

Sustainable transportation is the expression of the Sustainable Development concept within the transport sector and it refers to any kind of low impact transport which includes walking, cycling, transit oriented development, green transportation and fuel-efficient transport systems. Sustainable transportation has positive effects on the environmental, social and economical sustainability of the communities they serve. Transport systems exist to provide social and economic connections and people quickly take up the opportunities offered by increased mobility (Schafer, 1998). Besides the advantages of increased mobility, the economical, social and environmental costs that transport systems pose should be taken into consideration.

Transport is one of the major global consumers of energy, currently representing between 20% and 25% of aggregate energy consumption and CO₂ emissions (World Energy Council, 2007). According to the IPCC Fourth Assessment Report (Transport and Its Infrastructure), in 2004, transport was responsible for 23% of world energy-related Greenhouse Gas (GHG) emissions with three quarters coming from road vehicles. Over the past decade, transport's GHG emissions have increased at a faster rate than any other energy using sector.

The social and environmental costs of transport include road accidents, air pollution, physical inactivity, lack of livability of areas. Traffic congestion also causes economic costs by wasting people's time and delivery options of goods and services. The real purpose of transport planning should be accessibility, access to work, education, goods and services etc., instead of improving mobility for vehicles. Communities which are successful in improving the sustainability of their transport network can achieve sustainable urban development (Litman, 2011).

2.5.1.UNSUSTAINABLE TRANSPORTATION

Newman and Kenworthy (2000) mentioned in their article "Achieving Sustainable Urban Form: The Big Picture" that sustainability is now a generic word to express the need for a long term perspective where there is reduced demand on environmental resources and on environmental sinks; it also expresses the need to make the necessary changes in ways that are economically and socially beneficial. Cities cannot be considered sustainable if they are automobile dependent. Car dependence is associated with a range of environmental, economic and social problems, as set out in Table below (Williams, Burton, & Jenjks, 2000);

Table 2: The Problems of Car Dependence (Williams, Burton, & Jenjks, 2000, s. 109)

Environmental	Economic	Social
Oil vulnerability	External costs from accidents and pollution	Loss of street life
Photochemical smoke	Congestion costs, despite endless road building	Loss of community
Toxic emissions such as lead and benzene	High infrastructure costs in new sprawling suburbs	Loss of public safety
High green house gas contribution	Loss of productive rural land	Isolation in remote suburbs
Urban sprawl	Loss of urban land to bitumen	Access problems for carless and those with disabilities
Greater storm-water problems from extra hard surface		
Traffic problems such as noise and severance		

Organization for Economic Co-operation and Development (OECD) held a conference in 1996 in response to the concerns of governments regarding transport as a sector that constitutes serious problems for sustainable development. According to the OECD conference report the well known environmental and health effects of motorized transport include global warming and depletion of the ozone layer; spread of toxic organic and inorganic substances; depletion of oil and other natural resources; and damage to landscape and soil. The research of the Organization showed that the number of motorized road vehicles, then over 800 million world-wide, was growing almost everywhere at higher rates than human population; with road traffic growing even more rapidly. Air transport grows the most rapidly of all. Both road and air traffic are the most polluting and most energy-intensive transportation types. In short, transportation is unsustainable and is becoming more unsustainable (OECD, 1996).

The un-sustainability of the transportation is not just related with its use of fossil fuels or non-renewable resources and pollution it causes. In other words it is not just related with the environmental damages; there are other adverse impacts of transportation that are considered as unsustainable. Indeed it has a direct relation with the three pillars of the sustainable development. Transportation has a huge effect on environment, economy and social life.

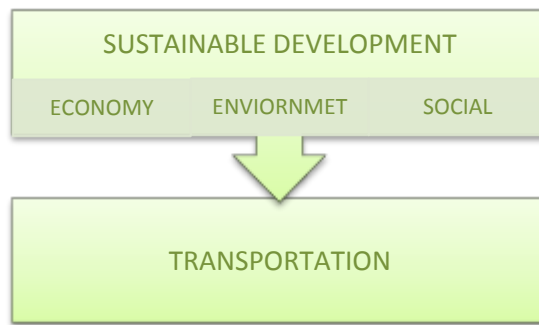


Figure 8: Sustainable Transportation Relation with Sustainable Development

OECD reported the economical, environmental and social issues concerning transportation as below;

- **Economical Issues Concerning Transportation**

There are some major non-environmental impacts of motorized transportation, including financial costs, accidents, congestion, and social disruption. They may not be sustainable.

- **Financial costs;** The major impact of the financial cost of transportation is lost opportunity: the amounts spent on transport/congestion
- **Accidents;** Accident costs associated with transportation can be significant and that many of these costs are not paid by transport users.
- **Congestion;** As well as magnifying the adverse effects of transportation by causing vehicles to function at sub-optimal speeds and thus use more fuel and pollute more, congestion can have financial impacts in that it raises the cost of goods delivery by road and impedes productive human activity

- **Environmental Issues Concerning Transportation**

Table 3: Matrix for Defining Sustainable Transport: Areas of Environmental Problems (Olsson, 1999)

Environmental aspect	Disturbance
Air pollution	Greenhouse effect, acidification, eutrofication, ground level ozone, depletion of ozone layer, etc.
Air in urban areas	Health pollutants, toxins
Noise	Disturbed human activity
Land use	Fragmentation of land
Eco cycle	Energy, material

- **Air pollution from transport;** The burning of fossil fuels to provide energy for vehicles results in several kinds of emissions as CO₂ into the atmosphere. CO₂ traps the sun's heat causing an increase in the planet's surface temperature, resulting in Global Warming and Climate Change.
- **Water pollution;** Pollution not only caused by sea transport; but from pollution on roads nearby rivers/seas/lakes etc.
- **Land-use;** Outside urban areas transport infrastructure can disrupt or destroy natural habitats and adversely affect the ecological balance.
- **Noise;** In OECD countries, 16% of the population is exposed to noise levels from transport capable of severely disturbing sleep and communication and thereby contributing to disease; an additional 50% is exposed to unsatisfactory noise levels from transportation

- **Social Issues Concerning Transportation**

The conference warned of socially disruptive effects of motorized transportation that may be potentially stronger than those resulting from excessive expenditure on transport or from lost time due to congestion.

It can be seen that transportation is precisely in the center of the concept of sustainability. Concept of sustainability expands itself as sustainable development and it says that we cannot do it without sustainable cities. As Yanarella & Levine (1992) suggest 'cities shape the world and we will never begin the sustainability process unless we can relate it to cities''.

In the previous section, three types of strategies for sustainable cities were explored; new urbanism, smart growth and transit oriented development. All of these titles have specific factors and criteria as their own concepts, but as we have seen all of these criteria can be classified under four main headings; land use management, transportation, environment and social interaction. Among them, many criteria that were listed are related with transportation because if the transport system is automobile oriented then the city cannot be made sustainable. Transportation has many effects on the three main pillars of sustainability which are economical, environment and social life. Consequently, if we look at the relations between these concepts, transportation has many effects on the others; for example, we cannot mention a social environment without a functional transportation network. As a result, we have to focus on the question "how can a sustainable transportation network be created?"

2.5.2.ACHIEVING SUSTAINABLE TRANSPORTATION

Increasing traffic congestion has negative effects on quality of life, such as waste of time during travel to and from work, shops, health, education and leisure; growing air pollution and increasing risks for safety because of accidents. The use of private car should be rationalized to avoid traffic congestion, and accessibility should be increased to workplaces, shops, health, education and entertainment with alternative transport choices, such as public transportation, walking, and cycling; and this can be possible by building more compact and mixed-used cities (European Commision, 2003)

There were many conferences and written policies about urban transportation, such as; European Union Common Transport Policy; CTP, 1957, OECD; Towards Sustainable Transportation, The Vancouver Conference, 1996, UK Transport of White Paper; A new Deal for Transport: Better for Everyone, 1998, Transport of White Paper; The Future of Transport, 2004, World Bank; Cities on the Move: An Urban Transport Strategy review, 2002. All these studies have a common expression saying that, transportation is an important issue for our economical, environmental and social developments. According to UK Transport White Paper, 2004, our quality of life depends on transport as all of us travel every day as a result we need an efficient transport system. On the other hand, we damage our towns and cities with our travel methods/modes. Indeed we are even affecting the climate of our planet by increasing the demand for transport (UK Transport of White Paper, 1998).

Planning Policy Statements (PPS) in the UK Planning System, which are documents prepared by the government as a guide for local authorities and others on planning policy and the operation of the planning system, have an objective to integrate planning and transportation at the national, regional, strategic and local level to;

- Promote **more sustainable transport choices** for both people and for moving freight
- Promote **accessibility** to jobs, shopping, leisure facilities and services by public transport, walking and cycling
- **Reduce the need to travel**, especially by car

In addition to the above issues, urban development and transport strategies have impacts on eliminating poverty, which is an important focus in many Policy Papers. The Urban Transport Strategy of World Bank (2002) is one of them and this study has two objectives which are;

- Develop a better understanding of urban transport problems both in developing and transitional economies
- Articulate an urban transport strategy framework for national and city governments

The study claims that 'to improve the efficiency of transport, the needs of each mode must be addressed such as the road systems, non-motorized transportation, public-passenger transport and mass transit.

- **The Road System;** efficiency can be improved through better system management, even in highly congested cities. Both technical assistance and investment are capable of yielding high returns in this field
- **Non-Motorized Transport;** is systematically under recognized.
 - A comprehensive vision and action plan for NMT is required.
 - Traffic management should be focused on improving the movement of people rather than on improving the movement of motorized vehicle.
- **Public Passenger Transport;** is for all.
 - Most urban public transport is road base.
 - Bus lanes and automatic priority at intersections can improve public transport performance significantly.
 - Exclusive bus-ways in developing countries have proved to be capable, except in very high traffic volume corridors, of performance nearly equivalent to rail-based systems but at much lower cost.
 - Pricing and financing issues are at the heart of public transport problem.
 - Cities should strive to mobilize the potential of the informal sector.
- **Mass Transit; systems** have a role to play in very large cities especially as a Rail-based mass transit systems. Urban rail-based systems should be cautiously appraised.

To achieve more Sustainable Transportation, the study of UK Transport White Paper announced the aim of the “new deal” with transportation as (UK Transport of White Paper, 1998);

- Cleaner air to breathe by tackling traffic fumes
- Quality places to live where people are the priority
- Increasing prosperity backed by a modern transport system
- Reduced rural isolation by connecting people with service and increasing mobility
- Easier and safer to walk and cycle
- Revitalized towns and cities through better town planning
- Introducing green transport plans which help to cut down on car use
- A major national awareness campaign

The need for integration of transport in sustainable development was also studied in European Transport White Paper. Shifting the balance between modes of transport is at the heart of the sustainable development strategy and it is claimed that (European Transport White Paper, 2001);

- If nothing is done to reverse the traffic growth trend, CO₂ emission from transport can be expected to increase by around 50% in 2010
- Road transport is the main culprit since it alone accounts for 84% of the CO₂ emissions attributable to transport
- Reducing dependence on oil from the current level of 98% by using alternative fuels and improving energy efficiency

Considering the above mentioned criticisms of unsustainable transport and proposed strategies to make it more sustainable, it can be stated that:

- **To make Transport Environmentally Sustainable:**
 - Pollution should be minimized, hence less polluting modes should be used

- Use of non-renewable sources should be minimized, hence less energy efficient modes and clean energy vehicles should be used
- **To make Transport Economically Sustainable:**
 - Dependence on external sources should be minimized, hence energy efficient modes should be used
 - Congestion and accident costs should be minimized, hence road traffic and car usage should be reduced
 - Risks on health and life expectancy should be minimized
- **To make Transport Socially Sustainable that is Equitable:**
 - Transport should be financially affordable by all
 - Transport should be physically **accessible** by all

(Urbanization Congress 2009 and METU CP704 Transport Policy Course notes)

Newman and Kenworthy (1999: 18-19) defined indicators for a sustainable transport in their sustainable city argument as follows:

- Sustainable Transportation
 - Reduce car usage per capita
 - Increase transit, walk/bike and carpooling and decrease solar use car
 - Reduce average commute to and from work
 - Increase average speed of transit relative to cars
 - Increase service kilometers/miles of transit relative to road provisions
 - Increase cost recovery on transit from fares
 - Decrease parking spaces per 1000 workers in central business district
 - Increase kilometers/miles of separated cycle ways

To summarize, policies for sustainable transport can be categorized under four headings:

- Improving and investing in public transport
- Improving and encouraging walking and cycling

- Restraining private automobile
- Supporting clean energy in public and private vehicles

The first three are particularly important because the fourth strategy can only help environmental concerns while it has limited or no effect on reducing congestion, accidents or inequalities in accessibility. Hence for sustainable transport public transport, walking and cycling should be promoted while car usage is discouraged. On the other hand, as discussed by many authors cited above (see Newman and Kenworthy, 1991 in particular) none of these policies can be effective if an urban area has developed extremely car-oriented with low density and sprawl because public transport usage, walking and cycling cannot be effective alternatives in long distances that is typical to sprawled low density settlements. This brings us back to the policies and strategies of sustainable urban design, namely new urbanism, smart growth and transit oriented development, all of which help to create public transport friendly and walkable cities that are not automobile-dependent.

2.6. SUMMARY

It was described above that transport policies can make the transport infrastructure more effective, but transport policies alone cannot change travel behavior and create more sustainable travel patterns. For sustainable transport, land-use and urban design have to support public transport and walking and cycling. Transportation policies can work effectively only after such a management of the land use.

Considering the review of the literature described throughout this chapter, it can be concluded that for achieving sustainable transportation, creating a sustainable urban form and therefore planning and neighborhood design are extremely important. This means that for sustainable urban areas, the operations must be performed in three scales of planning and urban design that can be classified as Macro, Mezzo and Micro scales. Based on the vast literature on sustainability, the strategies of these three scales can be defined as follows;

- **Macro Scale Policies**

- Compactness of the urban form in metropolitan scale (restraining urban sprawl, setting growth boundaries, growth management, etc) and prevention of sprawl
- Existence of sub-centers (a polycentric form that enables a mix of land-uses at macro scale and eliminates the need to travel to the city centre for daily needs or even for work purposes)
- An extensive public transport infrastructure: efficient public transportation system

- **Mezzo Scale Policies**

- Mixed-land use
- Pedestrian friendly development
- High density area
- Well served public transportation: efficient public transportation system and urban development focused on public transport stations
- Grid system plan (to ensure high connectivity and walkability in the micro scale)

- **Micro Scale Policies**

- Intensity of street network (to ensure high connectivity)
- Areas being well served with Public Transport
- Pedestrian friendly and walkable street sections
- Grid Plan for high connectivity
- Having majority of the neighborhood accessible on foot
- Existence of local services and amenities (mixed use)
- Interface with parking: parking areas should not be barriers for pedestrians
- Car-free pedestrian friendly areas

All these principles and the movements that they are derived from originate from studies and planning experiences from the West European and North American cities. This situation brings the question of whether all these principles are universal or not. In other words it should be clarified whether these approaches and principles can also be valid planning tools for cities in non-western countries, such as those in developing country cities in Asia.

A main concern of this study is therefore to explore whether the abovementioned planning and design principles for creating more sustainable transport outcomes can be a valid and useful guideline for planning in developing country cities too. Such cities often have already high development densities but also they face with sprawl problems and increasing car-dependency. Baku from Azerbaijan is one example to such cities and it is intended in this study to find out whether Baku with its specific planning background and resulting urban and transport structure can benefit from these design principles, or whether these design guidelines are inapplicable or unnecessary in this city's context.

CHAPTER 3

METHODOLOGY

3.1. THEORETICAL FRAMEWORK: MAIN FOCUS AREA AND STATEMENT OF THE PROBLEM

There is a vast literature on the use of urban planning and design tools to make transport systems more sustainable. How we plan the macro form of cities, how we plan different land-uses and densities, how we design neighborhoods have an effect on travel behavior. A set of planning and design criteria can change people's decisions on whether to make a journey by car, public transport, bicycle or walking.

In the previous chapter, the analysis of the literature focused on the Sustainability issue, its relation with the Sustainable Development and the basic trends and principles to achieve Sustainable Development. In the first chapter history of Sustainability and its relation with Sustainable Development were discussed. Accordingly it can be said that at first, Sustainability was discussed as an environmental issue in the world but afterwards the issue started to be discussed as sustainable city in the concept of sustainable growth which means the economic growth that can be supported by physical and social environments.

Although there are many definitions of Sustainable Development, the most well-known definition is by Brundtland Report, saying that;

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'

The concept of sustainability has appeared through a global political process that has tried to bring together the most powerful three needs of our time; need for economic development, need for environmental protection and need for social justice. As Kenworthy and Newman (1999) mentioned; when we refer to sustainable

development, we simply mean achievement of global environmental gains along with any economic or social development. It can be said that Sustainable Development has three basic pillars which means; Economically, Environmentally and Socially Sustainable Developments.

In the previous chapter, Sustainability and Urban Design were discussed together. In this Sustainable Urban Design context, there are five basic principles to make a city more sustainable;

Table 4: Basic Principles for Sustainable City (Newman & Kenworthy, 1999)

BASIC PRINCIPLES FOR SUSTAINABLE CITY	
▪ Energy and Air Quality ▪ Water, Materials and Waste ▪ Land, Green Space and Biodiversity ▪ Green Transportation ▪ Livability Human Amenities and Health	

In the Sustainable City literature the common idea is to create walkable, mixed-use neighborhoods which encourage efficient public transportation systems and social interaction. After the 20th century due to the increased car usage, land use functions began to divide which caused urban sprawl. To solve the problem and reverse this trend many movements and strategies were introduced that have been described in detail in the previous chapter.

For the strategies of New Urbanism, Smart Growth and Transit Oriented to be successfully implemented, the transport infrastructure must support sustainable transportation. When we focus on the question of “how can a sustainable transportation network be created?” it is seen that strategies fall under four categories:

- Improving and investing in public transport
- Improving and encouraging walking and cycling
- Restraining private automobile
- Supporting clean energy in public and private vehicles

All those principles related to the strategies and policies of sustainable transport, but to encourage more usage of public transport, walking and cycling needs more than that. None of these policies can be effective if an urban area has developed extremely car-oriented with low density and sprawl because public transport usage, walking and cycling cannot be effective alternatives in long distances. This brings us back to the policies and strategies of sustainable urban design which help to create public transport friendly and walkable cities that are not automobile-dependent.

To summarize, policies for sustainable transport can be categorized under four headings as mentioned above. One of the most important aspects is to implement urban planning and design approaches to encourage more usage of public transport, walking and cycling. Hence; transport policies can make the transport infrastructure more effective, but transport policies alone cannot change travel behavior and create more sustainable travel patterns. For sustainable transport, land-use and urban design have to support public transport and walking and cycling. Transportation policies can work effectively only after such a management of the land use. Considering the review of the literature described throughout this chapter, it can be concluded that for achieving sustainable transportation, creating a sustainable urban form and therefore planning and neighborhood design are extremely important. This means that for sustainable urban areas, the operations must be performed in three scales of planning and urban design that can be classified as Macro, Mezzo and Micro scales.

Table 5: Policies on Three Scale of Urban to more Sustainable Urban

SUSTAINABLE URBAN		
MACRO SCALE POLICIES	MEZZO SCALE POLICIES	MICRO SCALE POLICIES
_Compactness of the urban form in metropolitan scale (restraining urban sprawl, setting growth boundaries, growth management, etc) and prevention of sprawl _Existence of sub-centers (a polycentric form that enables a mix of land-uses at macro scale and eliminates the need to travel to the city centre for daily needs or even for work purposes) _An extensive public transport infrastructure: efficient public transportation system	_Mixed-land use _Pedestrian friendly, walkable development _Well served public transportation: efficient public transportation system and urban development focused on public transport stations _Grid system plan (to ensure high connectivity and walkability in the micro scale)	_Intensity of street network (to ensure high connectivity) _Existence of local services and amenities (mixed use) _Areas being well served with Public Transport _Grid Plan for high connectivity _Pedestrian friendly and walkable street sections _Interface with parking: parking areas should not be barriers for pedestrians _A hierarchy of narrow streets, boulevards and alleys _Having majority of the neighborhood accessible on foot _Car-free public areas

As mentioned in the previous chapter, these principles are derived and originate from studies and planning experiences from the West European and North American cities, and this situation brings the question of whether all these principles are universal or not. A primary concern of this study is therefore to explore whether the abovementioned planning and design principles for creating more sustainable transport outcomes can be a valid and useful guideline for planning in developing country cities too. Such cities often have already high development densities but also they face with sprawl problems and increasing car-dependency. However with their much different planning backgrounds and different urban structures can these cities in developing countries also benefit from

these design principles? The hypothesis and research questions of the study are formed in line with this argument in the following section.

3.2. HYPOTHESIS AND MAIN QUESTIONS TO BE ANSWERED

With respect to the main focus are of the thesis, which is the sustainable development, there occurred three main questions which are tried to be answered:

- What are the key elements to make an urban area sustainable?
- What are the planning and design principles to make urban transportation more sustainable?
- Can those principles be a framework for all the countries in the world (or can those principles be considered as universal)?

3.3. AIM AND OBJECTIVES

After the literature review about the sustainability issue, one particular point of discussion was raised: all these sustainable urban design and sustainable transportation principles originated from experiences in the American and European countries.

The underlying objective is to examine whether the above framework of criteria is applicable to a city like Baku, which has a different planning history and background compared to North America and west European cities.

An expected outcome of this analysis is whether this framework of criteria can be a mainstream checklist or guideline or whether there are certain cities, due to their own context, history and background, where these guidelines become inapplicable.

Depending on these arguments main tasks of the study are listed below;

- Application/assessment of the above criteria for the case of Baku to examine whether such plan and design approaches are relevant to this City
- Through interviews with experts from Baku planning agencies, assessment of planning and transport problems and potentials in Baku
- Assessment of issues specific to the Baku context with a view to explore whether they can be addressed by the above mainstream criteria or approaches

3.4. DEVELOPMENT OF THE FRAMEWORK OF CRITERIA

A set of principles was listed as those to achieve Sustainable Urban Development through sustainable urban form and transportation. These principles that are listed below consider the three main scale of the urban; macro, mezzo and micro scales.

Table 6: Design Approaches for Sustainable Urban Form

SUSTAINABLE URBAN DESIGN INDICATOR		
MACRO SCALE	MEZZO SCALE	MICRO SCALE
▪ Compactness; Mixed-land-use, high density and Non-sprawl ▪ Existence of sub-centers ▪ Public transport infrastructure	▪ Mixed-land-use ▪ Grid system plan ▪ Well served public transportation ▪ Pedestrian friendly – walkable development	▪ Intensity of street network ▪ Mixed-use ▪ Well served with public transport ▪ Grid system plan ▪ Pedestrian friendly and walkable street sections ▪ A hierarchy of narrow streets, boulevards and alleys ▪ Interface with Parking ▪ Neighborhoods accessible on foot ▪ Car-free public areas

3.5. RESEARCH METHOD

3.5.1. CASE STUDY SELECTION

Baku was selected as the main case study. This is because all the concepts reviewed in the literature chapter originate from the experiences of cities in west Europe and North America. Hence it is important to examine whether the planning and design strategies and guidelines for making urban transport more sustainable are relevant and applicable for cities with an entirely different context and planning background. Baku is a city that has a different planning and development background because of its history. In addition, because the author of this study is originally from Baku, there was the opportunity to access detailed data and documents. Information on both the country and city is provided below.

Azerbaijan, strategically located between Europe and Asia, has significant natural resources particularly oil and gas. The oil and gas sector has been consistently leading all other economic sectors. The non-oil sector -led by construction, services and agriculture - has also been growing but at lower pace. Baku, the capital city, has always been an attractive place to live. Today, the expanding range of economic activity and increasing cultural strength is increasing the region's popularity. Baku Metropolitan Region (BMR) is confronted with a number of challenges in order to maintain its livability.

There is a high employment rate. Baku Metropolitan region is an internationally connected region, integrated with global markets and equipped with a world-class infrastructure in all sectors. Baku Metropolitan Region is a leading centre of education and training in transport, a centre of excellence, within the region. Environmental awareness, health and safety, are high among residents, public authorities and the private sector (Strategic Transportation Plan, 2010);

- In Baku region the following development trends are foreseen by 2040:
- Population growing from 2,5 million to 3,0 million
- The land area for housing expanding from 40 000 hectares (ha) to 54 000 ha

- The number of jobs increasing from 0,8 million to 1,2 million
- Residential floor space growing from 60 million sq m to 100 million sq m
- The industrial land area reducing from 11000 ha to 7000
- The private car density will grow from 200 cars/1000 inhabitants to 400 cars/1000 inhabitants
- The public transport modal share will drop from 60 percent to 50 percent region wide while in the CBD it will remain at 65 percent.
- The daily passenger boarding in public transport will grow from 300 000 to 500 000
- The car stock will become less pollutant with the average emissions by car dropping by 60 percent.

Baku was the ancient city of the Soviet Union and has a variable history. Azerbaijan that lived under four states;

- 1918 Tsarist Russia
- 1918-1920 Republic of Azerbaijan (Mehmet Emin Resulzade)
- 1920-1991 The Union of Soviet Socialist Republics
- 1991 Republic of Azerbaijan (Heyder Aliyev)

As a result it has a different urban planning history. The main Master Plan of the Baku is taking a shape according to the plan that was approved in 1987. Up to 1987 plan Baku had 5 different Master Plans;

- A. İvaniski 1927
- V. Semyenov 1932
- L. İlyin 1937
- Bakqipogor 1954
- Bakqipogor 1986

Table 7: Master Plan Development of Baku

MASTER PLANS	DATE and ARCHITECT
	Master Plan of the Baku City, 1898-1900 Architect; Fon-der-Nonne Date; Approved 18 January 1898
	Master Plan of the Baku City; 1915-1918, Architect; Hacinski
	Master Plan of the Baku City, 1924-1927, Architect; A.P. Ivaniskiy, Settled Sheme of the Azerbaijan Settlements
	Master Plan of the Baku City, 1934-1937, Architect; L.A. Ilyin
	Master Plan of the Baku City, 1986, Architect; University of Baku State Project

Today the State Committee on Urban Planning and Architecture is studying on the New Baku Master Plan with the fund given by World Bank.

3.5.2.METHOD FOR DATA COLLECTION

In this study, the data for Baku Urban Planning was considered a primary source. To access these data and documents, interviews were conducted with the Professors in Baku Architecture and Construction University, Department of City and Regional Planning and Department of Architecture and also Architects and Urban Planners in The State Committee on Urban Planning and Architecture and also the experts in The State Statistical Committee. Aim of these interviews was to get the correct information about the Baku Urban Planning Strategies with the experts and the academicians. Besides, individual analyses were also made by field trips around the selected there main study areas in the city, and sketches and photographs were taken.

- **Interviews were made with;**
 - City Planners and Architects who have experienced both past Soviet Period and current developments of Baku
 - **Cafer Qiyasi;** Architect, Professor at Baku Architecture and Construction University, Department of Architecture
 - **Fikret Huseynov;** Architect and Urban Designer, Professor at Baku Architecture and Construction University, Department of City and Planning
 - Experts in Municipalities and ministers of transportation and planning to access the city development and transportation maps belonging to both Soviet Period and current development of Baku
 - **Novruz Eldarly;** The State Committee on Urban Planning and Architecture, Azerbaijan Republic, Greater Baku Regional Development Plan, Project Implementation Unit
 - **Yagubzade Yusif Oruj;** State Committee of Town Planning and Architecture, Azerbaijan Republic, Head of Urban Planning Department, Honored Architect of Azerbaijan

- **Mr. Sahip;** Director of the Department of Constructing and Projecting of the Materials
- Experts in The State Statistical Committee to obtain data about transportation
 - **A.M.Aliyev;** Director of the The State Statistical Committee of the Republic of Azerbaijan
 - **Umit Hasanov;** Expert at The State Statistical Committee of the Republic of Azerbaijan
 - **Turunc Quliyeva;** Director of the Department of Industry Transportation at The State Statistical Committee of the Republic of Azerbaijan
- **Map analysis;** analysis on both past Soviet Period and current city development and transportation plans,
 - Analysis of transport nodes
 - Analysis of land-use planning/land use interaction;
 - Neighborhoods
 - Business centers
 - Community centers etc.
 - Traffic and land use interaction
- **Data analysis;** from The State Statistical Committee of the Republic of Azerbaijan
 - Car ownership data
 - Motor vehicle ownership data
 - Usage of public transportation
 - Usage of non-motorized modes etc.
- **Field Trips;** analysis by walking through the selected three routes in the city with a view to:
 - Making sketches
 - Taking photographs

CHAPTER 4

HISTORY OF BAKU URBAN PLANNING

4.1. BAKU URBAN PLANNING BETWEEN 19TH AND THE BEGINNING OF 20TH CENTURIES

Baku was the ancient city of the Soviet Union. Baku the capital city of the Azerbaijan settled on the west coast of the Caspian Sea. The specialty of the Baku was its thin and long streets within the wall of the Castle. Baku was the biggest industry and economy center of the Caucasian with its architecture and city planning. After discovery of the oil deposits in Absheron, Baku became the most important center for the Russian Empire during the second period of the 19th century. Lots of foreigners came for that oil deposits. Area of the Baku started to grow with the developments of industry and economy. With respect to those improvements; monuments, boulevards, and squares began to be built (Fatullayev, 1986).

Table 8: Population-City Budget (Fatullayev, 1986)

POPULATION			CITY BUDGET		
1854-1857	1874	%	1846	1862-1872	%
8374	14577	185,3	4885	53777	1100,8

4.1.1. PROPERTIES OF CITY PLANNING

When Baku entered under the protection of the Tsarist Russia, the city came out of the Castle walls/borders in 1806. It was geographically important because of the sea port that it had and the trade route passing through Baku between Russia and Iran. In that period, the biggest highway was the Shamakhi highway which was a connection between Baku and Shamakhi. After 1840, the highway developed and connected with all roads of Absheron Peninsula. Intersection of those roads created a square and around that square there were caravanserais and one-two storey houses which created a trade street under them. With those developments, traders

and artisans began to arrive to the city and population grew. Growth process of Baku started therefore in 1806 when the city entered under the protection of Russian Empire and continued till 1914 and it was actualized in 4 phases. The first phase was in 1843, the second was between the years of 1843-1878, the third growth phase was from 1878 to 1900 and the last one was in between 1900 and 1914 as showed in the table below (Fatullayev, 1986).

Table 9: Area Development Schema (Fatullayev, 1986)

AREA DEVELOPMENT SCHEMA				
PERIODS		AMOUNT OF THE AREA		%
		(HA)		
1843		63,7		9,2
1843-1878		110,1		16,2
1878-1900		361,8		52,4
1900-1914		153,3		22,2
TOTAL		688,9		100,0
DEVELOPMENT OF BUILDINGS				
PERIOD	TOTAL	%	JUST LIVING	%
1843	3378	16,9	3049	18,6
1843-1878	3736	19,0	3137	19,1
1878-1900	9282	46,9	7578	45,4
1900-1914	3433	17,2	2551	16,9
TOTAL	19829	100,0	16315	100,0

After the castle lost its defense function and importance, areas surrounding the castle were started to be used. The sea side in front of the castle was used as a warehouse for the port. Sea shore/port became used as a trade center. It was growing through the east and pedestrians were not allowed to enter the sea shore. With those expansions total area of the city became 65 ha with 21, 5 ha old city. Although the plan drawn in 1854 was designed in rectangular/grid form, with the beginning of the use of sea shore, plan was designed according to the coast line (Fatullayev, 1986).

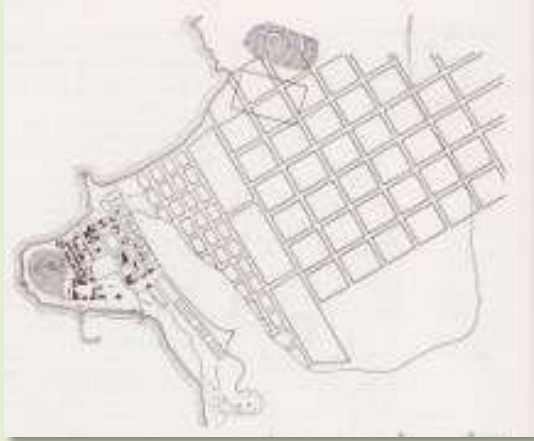
After Shamakhi being the center of province, the biggest highway was designed between Shamakhi and Baku. With the planned/designed shops, stores and caravansaries the road became the busiest one and the landscaping designed around it turned the road into a boulevard (Fatullayev, 1986).

Population was increasing while the city was growing and port was getting more important because it allowed the transition between Iran and Russia. After that government took the control of the unbounded ports and in 1858, harbor/port city was designed in Bayıl District as showed in Table 10. According to the plan, there were shops, stores and lodgings. The area was 4 km2 and the plan was designed in a grid form and all the streets were open to the sea side. There were also separated agricultural areas sized 213*213 and each resident had the same sized area (Fatullayev, 1986).

Table 10: Master Plans of the Bayıl (Fatullayev, 1986)

MASTER PLAN OF BAYIL	DATE
	Bayıl Master Plan in 1863

Table 10 Continued

MASTER PLAN OF BAYIL	DATE
	Bayıl Master Plan in 1880-1890
	General Master Plan of Bayıl

4.1.2. BAKU AS A CENTER OF THE PROVINCE 1859-1920

Because of the earthquake that occurred in Shamakhi in 1859, center of the province was moved to Baku and all the governmental buildings moved to there. As a result, railway system, new residential buildings, caravansaries and commercial areas were planned and designed. While there were unplanned developments in Baku, in 1864 new plan (Figure 9) was designed. The new plan included 183 ha of area and 21, 5 ha of it belonged to the old city/castle. 89, 3 ha of the total area consisted of old

buildings and 19, 5 ha was designed for new streets and buildings. Areas allocated for future development were 36,5 ha and 15, 5 ha area was left empty or undeveloped. The new plan was bigger than the old plan which was designed in 1843 in the aspect of land usage. Land sizes were; 21, 34*25, 6 / 25, 6*32 / 32*37, 34 in the plan of 1843, but in the plan designed in 1864, land sizes were as big as 100*30 (Fatullayev, 1986).

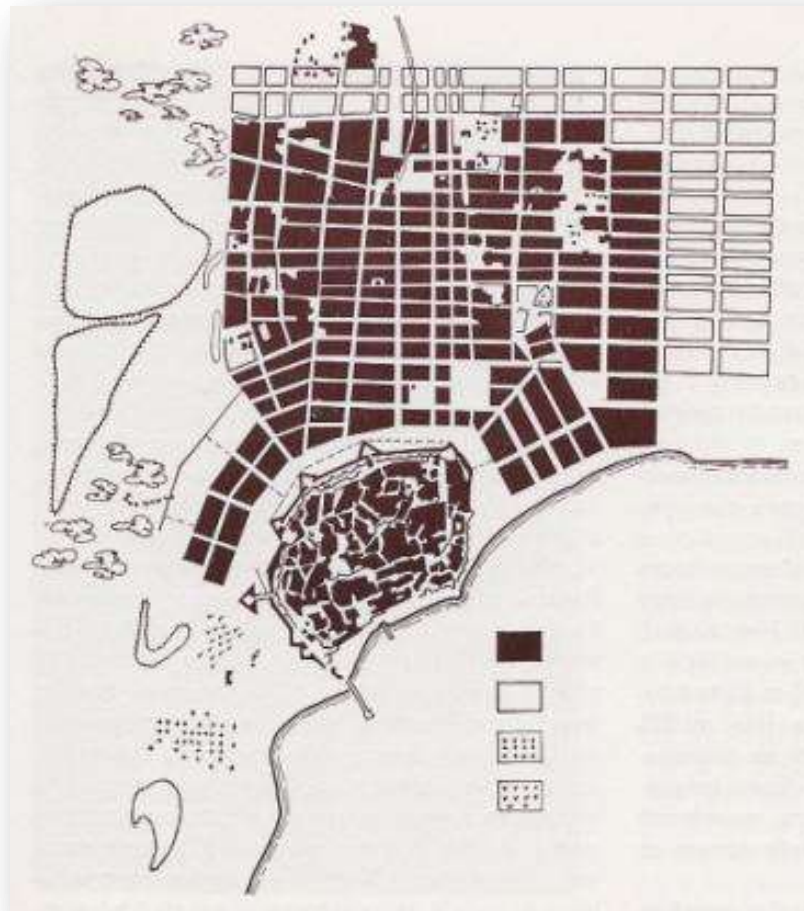


Figure 9: Baku Plan in 1864 (Fatullayev, 1986)

Qasimbey Hacıbabayev (1811-1874) was a famous architect and developed the street design and architectural buildings. He also designed the sea side/seaport as in Figure 10 (Fatullayev, 1986).



Figure 10: View from Sea Side/Sea Port (Fatullayev, 1986)

In 1862, total area of agricultural land was 166, 5 ha which was more than city area. During the plan developments, agricultural area started to decrease while city area was growing. After the 1860s, those areas turned into caravanserais and residential buildings. However, the biggest development of Baku was the openings of the oil factories. At the beginning oil factories and deposits were built unplanned. After 1870, because of the air pollution, government decided to collect them in one place. As a result, Qara Şehir/Black City (Figure 11) was constructed. In 1876, no one could build an oil factory anywhere else except Qara Şehir/Black City. Like Bayıl, stores, shops and residential buildings were again designed in a grid plan (Fatullayev, 1986).

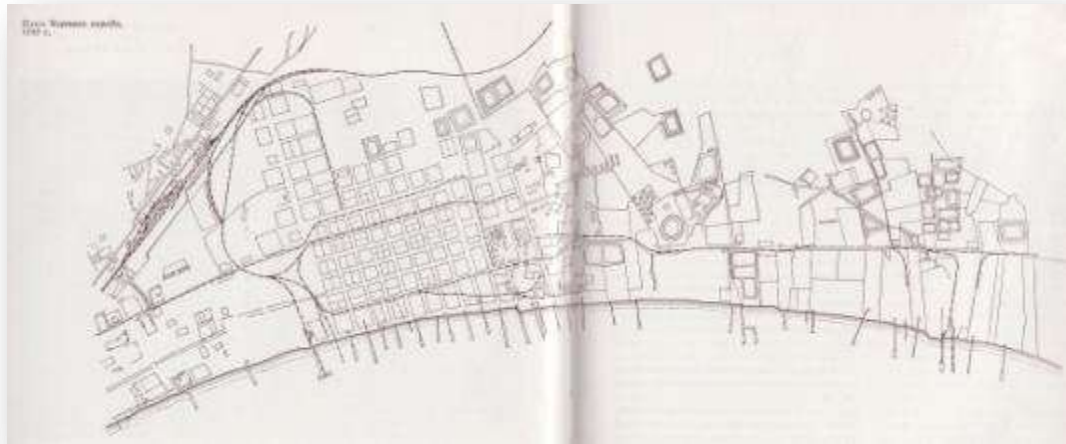


Figure 11: Plan of Black City (Qara Şehir), 1899(Fatullayev, 1986)

In 1878 a new plan started to be developed. The new plan consisted of 3 parts which were Bayıl the port/harbor town, city itself meaning the castle and the area around it, and the Black City, the oil town. Although the area of Bayıl and the area of the Black City were located in a contrary side of each other, there were highways planned for the connection/transition. North side of the construction was half a kilometer more than the plan designed in 1864. The 300 m swamp area in the sea side was designed as a promenade. City was growing as 1.5 km to east and 2km to south. The total area became 250 ha while it was 89,3 ha in 1864. However, while city center was being improved, outside of the city could not be developed because of the management which focused on just the center. In 1880 the first railway station was designed and constructed. It was located on the intersection point of the all roads of Absheron and also it connected with the three main areas of the Baku which were Bayıl, City Center and Black City (Fatullayev, 1986).



Figure 12: General Plan of Bayıl, City Center and Black City, 1878(Fatullayev, 1986)

The city was growing rapidly; population was increasing, many oil factories were opening. Result of those expansions created the need for a new plan and in 1898; another new plan was produced as showed in Figure 13. Being a 10 year plan designed by Fon-Der-Nonne, it proposed new living areas. There were 109, 25 ha planned areas for the indigent/poor people and had three different types of housing which had a size differing from 450 m² to 900 m². The town was designed for approximately 5000 people and consisted of schools, hospitals as a part of it (Fatullayev, 1986).

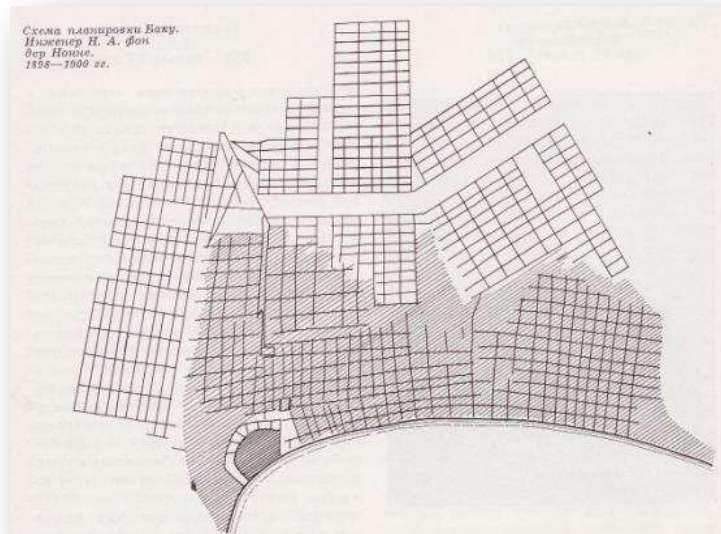


Figure 13: Baku Plan, 1898-1900, Engineer N.A. Fon-der-Nonne(Fatullayev, 1986)

New towns were designed wider because the city was getting crowded and again the grid plan was used for their design. The main consideration was the wind of the Baku while planning those areas. As a result, all the buildings were located facing the south. During the time period, when those towns started to connect with cities, street design became an important issue (Fatullayev, 1986).

In the new plan, relationship between residential areas and railway system was considered. Through the sea side 45 separate ports were designed which means that the entire coast line was designed as a harbor. There were huge commercial areas in the center and wealthy people could afford to live in that area. According to the plan of Nonne, city would be growing twice as much as it was. The main important issue considered was the topographic contours while planning. A huge park was also planned for people especially who did not have their own summer houses. In that plan total area of the alleys would be 100 ha. Although Nonne's plan was criticized with its un-thought streets, both Hacinski and Ivansiki took the same principles of Nonne's plan for their urban plans. With that plan, the total area of Baku became 1750 ha. City center became the center of shops, stores, hotels, clubs, education and palaces of both foreign and local people (Fatullayev, 1986).

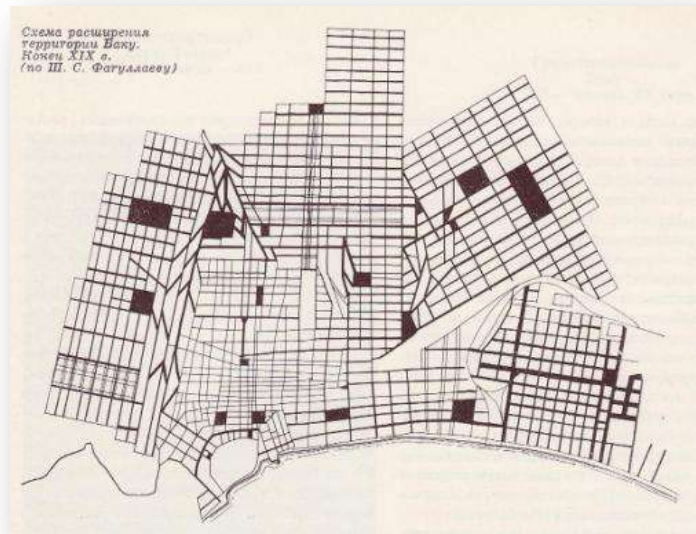


Figure 14: Expansion Plan of Baku (Fatullayev, 1986)

In 1908 Hacinski offered his fan shaped plan that he exemplified with the plan of Paris and Vienna. After he got the acceptance for his plan, Hacinski started to design the north and north-east sides of the city. He opened a water channel 190km far from Baku and this effected the industrial and economical developments of the city. Moreover drainage and green area developments of the city also changed. With this plan, a tram project began to be constructed and 270 ha new development areas were planned. Grid plan form was used from north to south and he developed narrow and uneven streets and inadequate green areas. The width of the streets should have been 26, 5 m and developed two different plans. In the first plan, he used the dual fan method and for second one he proposed a more rigid, rational and grid plan. Hacinski planned elliptic parks on the intersection points. This plan was better than Nonne's plan in terms of green areas. However, because of the February revolution in 1917, all those plan developments lost their validity (Fatullayev, 1986).

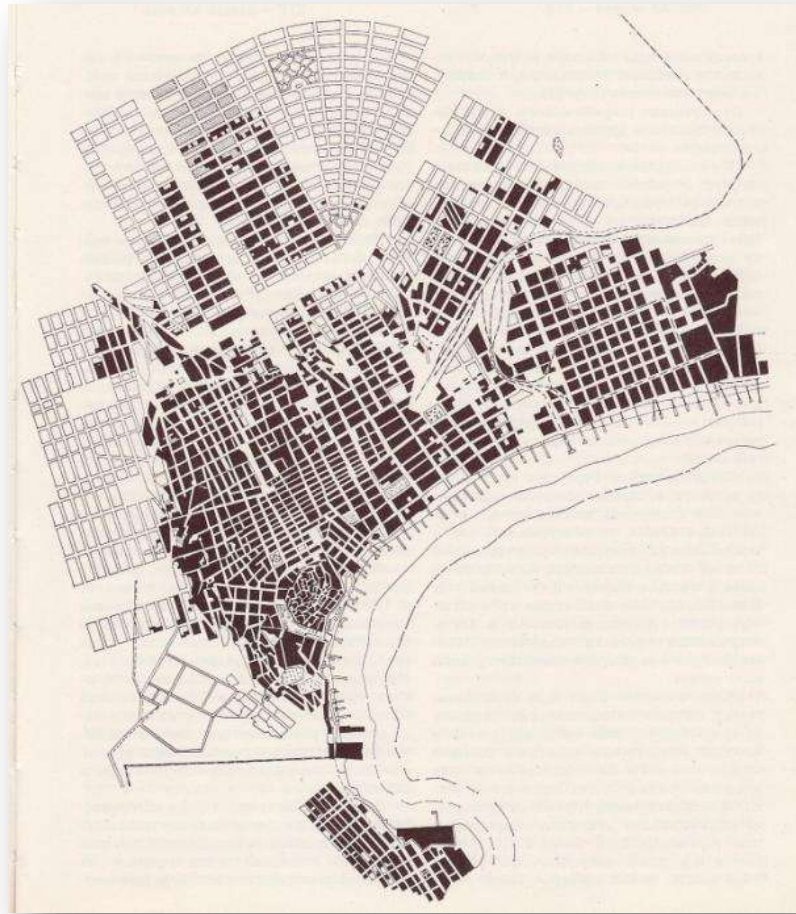


Figure 15: Baku Plan, 1918(Fatullayev, 1986)

City assimilated its developments from 1806 to 1918. Master Plan development through those time periods is showed in Figure 16. All political and economical situations affected those developments in each time. As a result there were ups and downs during the improvements. After all those developments and expansions Baku became one of the most important cities of the Russian and Caucasians while it was a significant city for only Caucasians during the first half of the 19th century (Fatullayev, 1986).

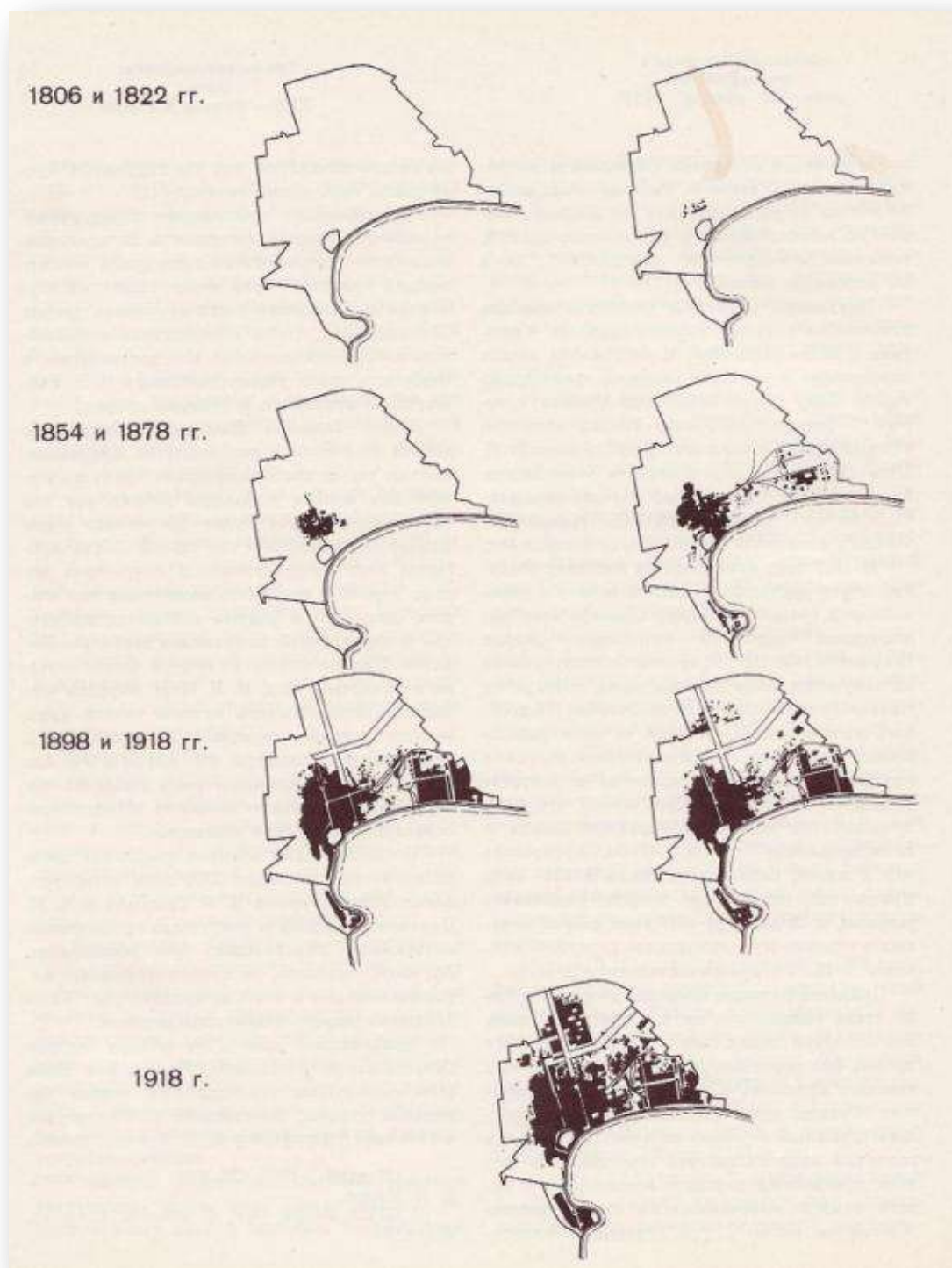


Figure 16: Master Plans of Baku, 1806-1918(Fatullayev, 1986)

4.1.3. FORMING OF THE CITY CENTER AND HIGHWAYS

Baku consisted of just a castle and grid construction around it in 1809. The entire administrative and commercial centers were located within the castle. In the 1864 plan the castle was in a whole with its surroundings. Shamakhi highway was the only trade route and it was a main axis for the city. It was separated into two directions as east and west which were reaching to the sea side at the end. Like all European cities, there was a main axis and other roads connected with that. As a result, system allowed growing as Kiev, Moscow and Paris (Fatullayev, 1986).

With the project of 1880, the city started to grow through the north side as well. With an unknown architect, there was a rectangular square rounded with trees, viewing the sea. The other vertical and parallel squares connected with that square. In the middle of that square there was a church but as it was a planned area on a Muslim graveyard, the proposal was not accepted (Fatullayev, 1986).

In 1890, 3 ha area was designed for the administrative area. Schools, commercial and educational buildings were also designed around that area. An 18m wide trade street was designed, Figure 17, named Nikalay Street, between the castle and residential buildings within the city. Street was designed to end with sea side. 450 m wide Sadova Street was constructed in 1885 and there were again educational buildings and palaces around it (Fatullayev, 1986).



Figure 17; Nikalay Street, 1882, Architect A. Kosinski and View from Sadovi Street(Fatullayev, 1986)

In 1860, the sea side was constructed as a promenade, Figure 18. Behind the sea side a boulevard/road was designed named Azadlıq Meydanı/Freedom Square. In 1897 government accepted the plan law for the 30m wide promenade and in 1909 the promenade was expanded (**Fatullayev, 1986**).

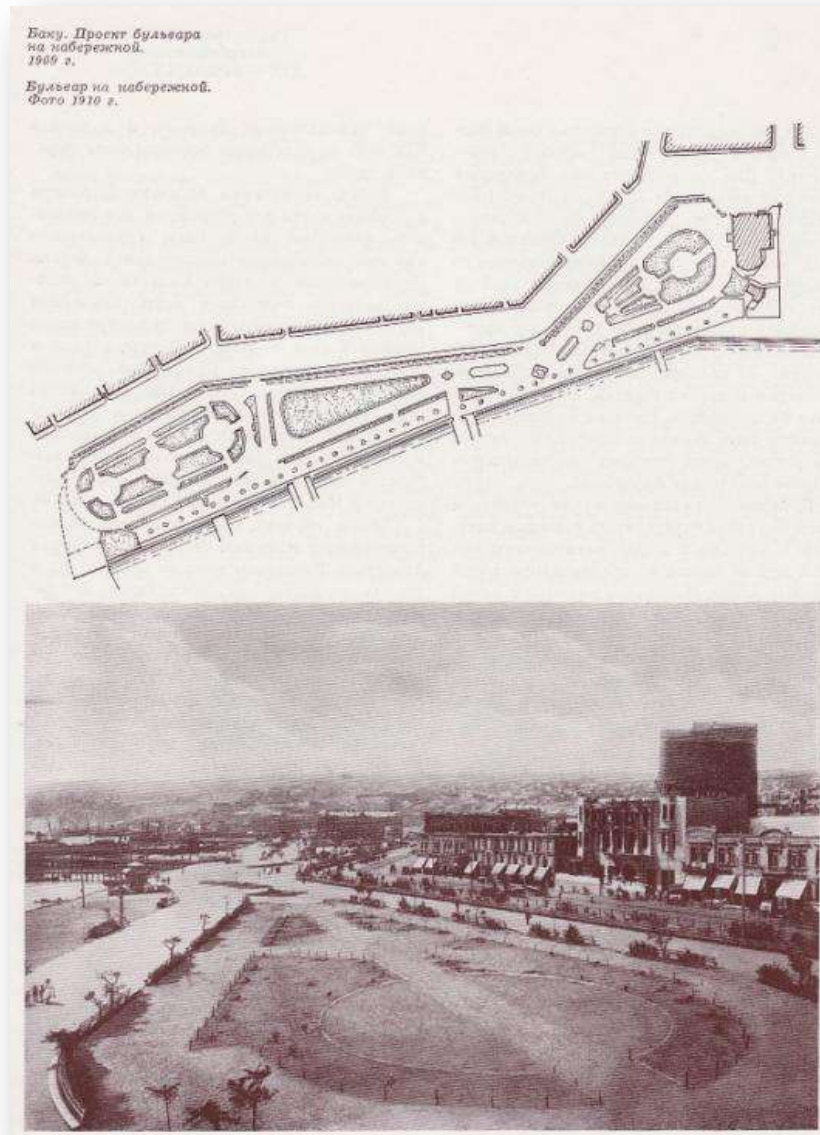


Figure 18: Plan in 1909 and View of the Promenade/Sea Side in 1910

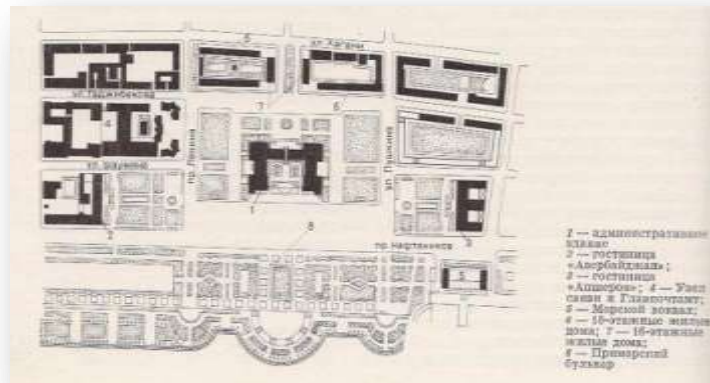


Figure 19: Mixed-use Plan of the City Center (Fatullayev, 1986)

Behind the promenade there were mixed used planning as showed in Figure 19.

1-Government building, 2- Hotel Azerbaijan, 3- Hotel Absheron, 4- Main Post office, 5- Marine Hotel, 6- Residential Buildings, 7- Residential Buildings, 8- Promenade/Bulvar (Fatullayev, 1986).

Two more streets were designed which had stores, shops, banks, and hotels along them. During 1896-1898 passages were also designed with a project. Big glass stores were held inspired from the European cities (Fatullayev, 1986). There were 9 squares, Figure 20, which had an order. Some of them were used for shopping and some of them were used for entertainment (Fatullayev, 1986).

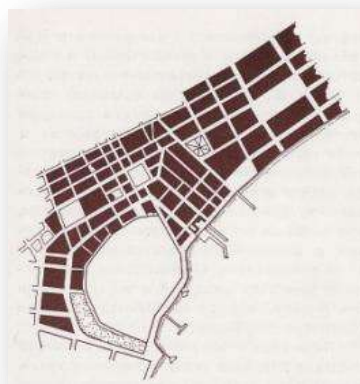


Figure 20: Plan of the Squares, 1910, Architect/Urban Designer Ş.S. Fetullayev(Fatullayev, 1986)

4.2.BAKU URBAN PLANNING THROUGH THE SOVIET AZERBAIJAN

In the Soviet Period planners enhanced the grid system of current master plan and achieve the 1924 Master Plan by infill development of the non-designed plots as showed below.



Figure 21: Baku Planning Design, 1924 (Efendizade, 1986)

According to that plan, architects developed the city borders to the natural borders of the amphitheater, in other words main Baku borders. This plan was 13 300 hectares and consisted of the sea in the south, Yasamal hill in the west, great shor lake and oil area in the east. It mainly had two areas, center and the industrial area which had its own residential districts/quarters. This land use plan was protected in

the other Master Plans. Besides those land use planning, there also designed highways that appropriate to the lands infrastructure to make a connection between the other regions and industrial area. Planner also gave importance to grow green areas, by designing parks and leisure spaces. As a result boulevard which is 3 km length and 68 m wide was designed as a leisure and commercial area in 1967 (Efendizade, 1986). In the current situation, 2011 Boulevard is still 3 km length but it is approximately 170 m wide and it is the most important leisure place of Baku.

Planners started to use the current plan and developed the areas which are not designed of that plan schema. There were designed neighborhoods, streets and architectural buildings. The main idea of the planning system, as seen in the Figure 22, is to create streets and clusters which have courtyard in between.

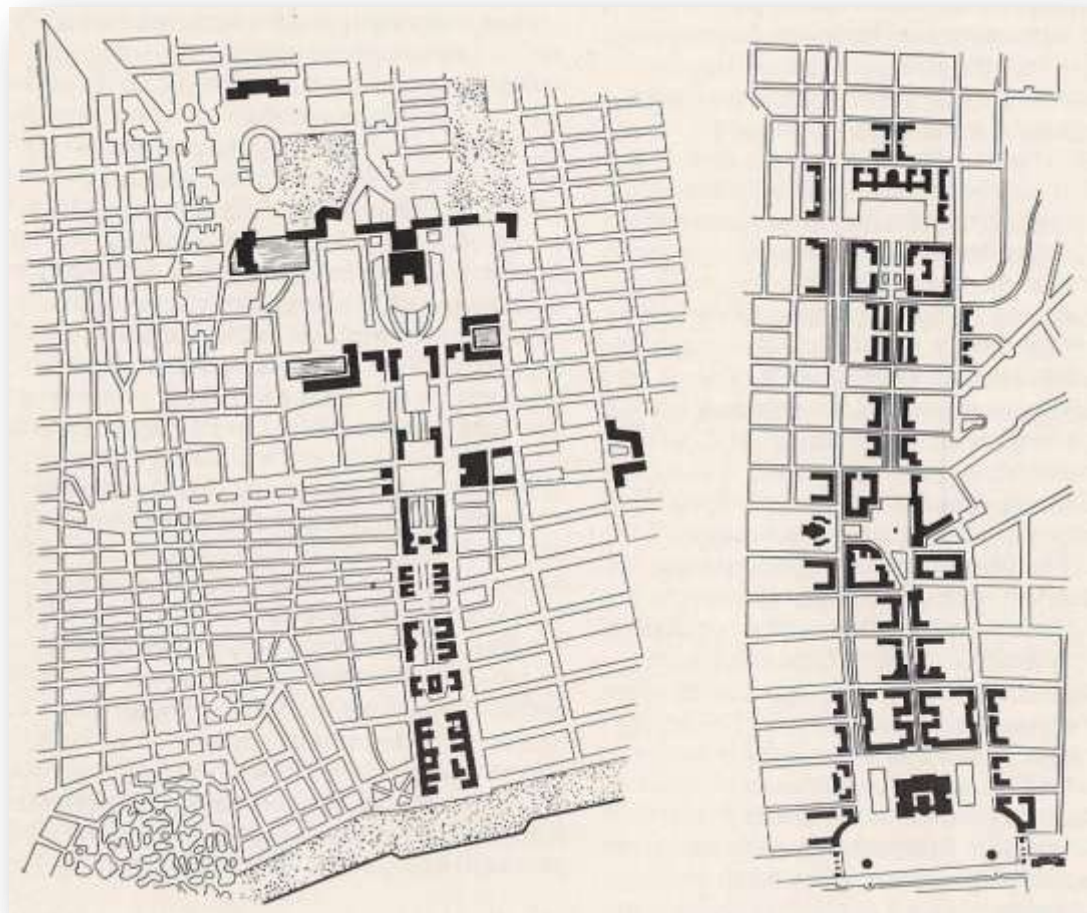


Figure 22: Baku Downtown Layout, 1932 and Baku System of City Centers, 1937 (Efendizade, 1986)

The population of Baku was 665 000 in 1937 and it was reached to 750 000 in 1942. City was formed according to the natural layout of the land. Planners designed neighborhoods within the empty clusters with a great order. Residential units that were designed generally had the one or two storey (Efendizade, 1986).



Figure 23: Baku Layout of Main Ensembles (Efendizade, 1986)

In 1950s architect M. Huseyinov made the revision plan as shown in the Figure 23. He planned the different functional building like as, administrative buildings, social buildings, cultural buildings as theaters and residential buildings along the main streets. This attitude made the Baku center multi-functional use.

The Figure 24 show one of that designed streets in the city center which is the October square. This square had again multi-functional use approach as it has

institutional building that belongs to the railway administrative, great Baku Hotel, another 25 storey administrative building and theatre building.

Planning system of Baku will continue to with those aspects which gave the importance to the multi-functional use of the land, highways and main street layouts to make a connection between regions within and outside of the city.

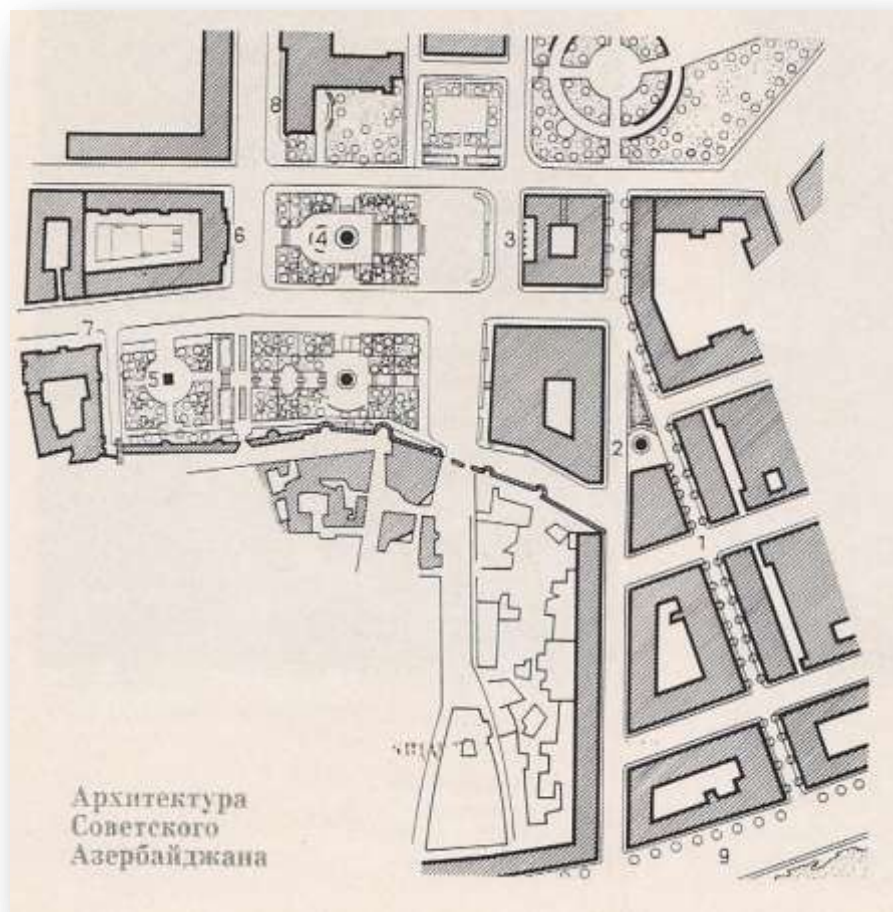


Figure 24: Sketch of October Square Development (Efendizade, 1986)

CHAPTER 5

ANALYSIS OF BAKU IN TERMS OF SUSTAINABLE DESIGN AND TRANSPORT

In this chapter of the thesis, the selected case area, Baku, is analyzed with regards to the approaches of sustainable planning, design, and transport that were discussed in the literature above. In particular, the relevance of approaches, such as new urbanism, smart growth, etc., is to be questioned in the context of Baku. The case area is studied in three scales of urban design which are macro, mezzo and micro scales. For the macro and mezzo scale analysis interviews were conducted with the urban planners, urban professors and architects to understand the design idea of the Baku urban planning. Experts from City Statistical Committee helped for the some statistical data's and also map analysis are done. For micro scale analysis three selected routes were analyzed by walking trips with drawing sketches and taking photographs. The main idea is to understand how Baku performs in terms of the criteria of creating a sustainable urban form and pattern; whether Baku has a problem in terms of unsustainable forms, design and transport; whether it can benefit from the approaches such as new urbanism, or whether such approaches are irrelevant in the case of Baku. In order to make a conclusion, all three scales were studied according to the principles which had been studied in the literature.

Baku, being 2130km², has started from the intersection of the three main highway of Azerbaijan; Sumgait Highway, Shamakhi Highway and the Silk Road.



Figure 25: General Map of Baku Relation with the Main Road System of the Azerbaijan

Baku has 11 administrative regions. The population of Baku is said to be 2 246 000 with refugees but the experts said that the actual population is approximately 4 million. Baku consists of three main zones. The first one is Absheron district which called Great Baku, the second one is Baku administrative which occurred with industrial, residential and administrative areas and the last zone is the Private Baku which was designed as a residential area but currently has a huge mixed-use development. In this thesis these three zones were used as a reference for the three main scales of analysis.



Figure 26: Three Zone of the Baku Region

5.1. MACRO SCALE ANALYSIS

In this part of the analysis Great Baku was examined to find how the metropolitan area performs in terms of those principles of sustainable urban design. Accordingly analysis was made to find out the compactness of the city and the data from Statistical Committee helped to make an analysis regarding the transportation system of the city.

Macro scale indicators for the Great Baku as we see in the Table 6;

- **Compactness:** Çalışkan describes the indicators of urban compactness as **High Density and Mixed-Use** (Çalışkan, 2009).
 - **High Density:** below certain density levels car dependency becomes inevitable; this threshold is 35 persons per hectare (Newman & Kenworthy, 2006) or 40 persons per hectare (Banister, 2008)

Table 11: Area and Population Density of the Baku

Cities and Districts	Area(ha)	Population	Population Density for 1 ha
BAKU CITY	213 000	2 046 100 2 246 000 with refugees	10,5
Bineqedi Region	17 000	238 600	13,99
Hazar Region	40 000	169 100	4,22
Qaradakh Region	108 000	108 200	0,99
Hetai Region	3 000	245 200	81,37
Nerimanov Region	3 000	161 100	53,50
Nesimi Region	1 000	208 300	207,90
Nizami Region	2 000	178 100	88,70
Sabunchu Region	24 000	220 100	9,17
Sebail Region	3 000	90 300	30,00
Surakhami Region	10 000	195 000	19,41
Yasamal Region	2 000	232 100	115,70
SUMQAYIT CITY	8 000	309 700	38,59
HIRDALAN CITY	?	92 000	?
ABSHERON REGION	13 600	189 800	13,95

In density calculations, boundaries of the area taken as the basis of city territory are a key issue. In many density calculations regarding Baku, including the one in the table above, take the whole of Baku city territory, without excluding undeveloped large areas, such as urban and regional parks and major industrial estates. Therefore, having a larger denominator as the area results in lower density figures on paper. For example, in one of the relatively higher density calculations, Architect and City Planner Novruz Eldarly stated in an interview that territory of the Special Baku was 23 000 hectare (230km²) and considering that over 1.9 million people are living in that area, the density is calculated to be 82, 6 people per hectare. This is an average figure and therefore it should be expected that the city centre and inner city residential areas, such as Yasamal, should be much higher than this average. Nevertheless, considering this average against the thresholds given by Newman (2006) and Banister (2008), the average density in Baku is much higher than those thresholds.

Although detailed urban density figures for city center and sub-regions could not be obtained, it is known that Baku city center has a very high population density. As stressed in the Strategic Transportation Plan, the city center of Baku, as well as some residential areas in inner city, such as Yasamal, has “super-high” density areas. The Plan report does not give a specific range for these super-high dense areas; however, it stresses that the inner city has a very high density of population.

Another parameter of high density is related with job density. Once again in central Baku, there are “super-high” density areas in terms of employment: these areas have up to 500 people working (i.e. jobs) per hectare. (Source: Strategic Transportation Plan for the Baku Metropolitan Region).

- **Mixed-Land use and Non-Sprawl:** mixed land use is the availability of adequate public such as community centers, schools, utilities, emergency services, parks recreations and open spaces etc (Freilich & Popowitz, 2010). **Non-sprawl** is the control and regulation of development at city fringes to limit low-density dispersal of housing areas.

Baku always performs as a mixed-use development. In 1987 Master Plan, Great Baku was formed with residential, industrial and farming areas. Besides, in the core area there were trade centers, educational areas and institutional areas with residential areas. With various developments, Baku hosts multi-functional areas such as (Figure 28); multi leveled housings, tourism areas, educational areas, industry areas, protected zones, and oil areas with the recreational areas.

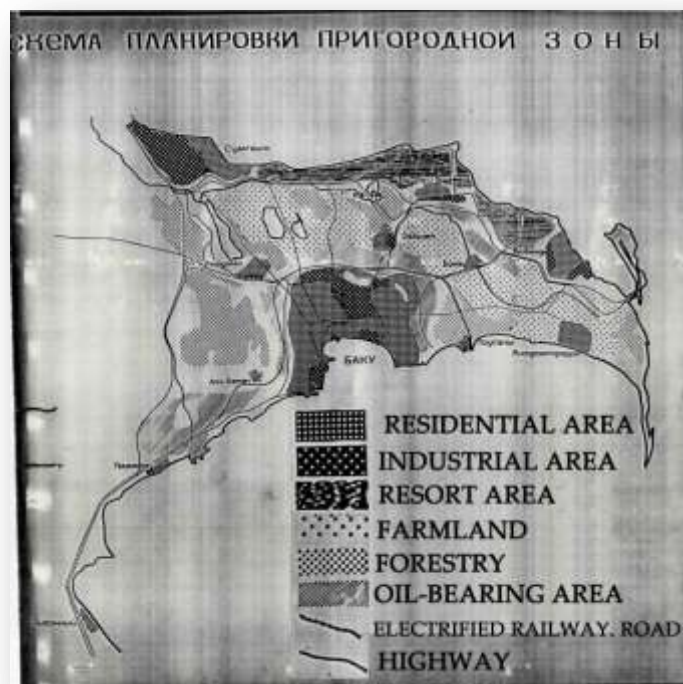


Figure 27: Plan Schema of the Urban Zone

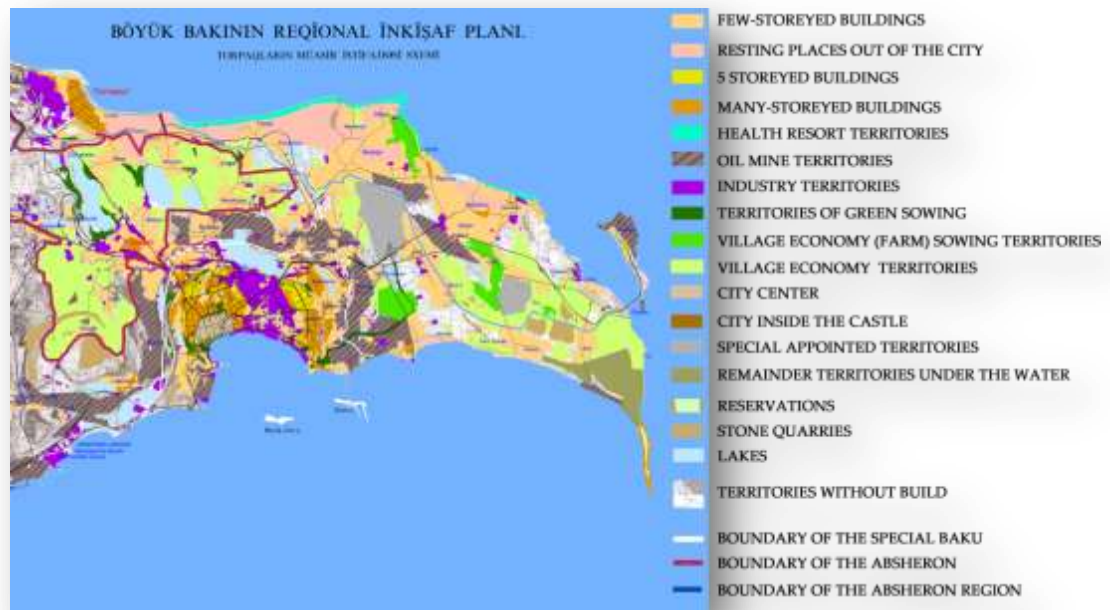


Figure 28: Great Baku Land Use Plan

- **Existence of sub-centers; a polycentric form that enables a mix of land-uses at macro scale and eliminates the need to travel to the city centre for daily needs or even for work purposes.**

Great Baku has sub-centers as Surakhani District, Khazar District and Sabunchu District in addition to the Central area as seen in Figure 29. Although those areas developed dispersed they are designed to provide their own basic needs as educational, residential, welfare, commercial and leisure facilities. There is also efficient public transportation system such as bus stations in walking distance (approximately 250-300m) to connect those sub-centers with the central area. However, the density of job opportunities and the high educational areas is very low in those areas resulting in inhabitants to travel to the city center every day.



Figure 29: Sub-Centers of Great Baku

According to the Strategic Transportation Plan for the Baku Metropolitan Region (BMR); the total hectares for housing will grow from 40 000 ha to 60 000 ha. Most of the land occupation goes to low density housing, which even now is the dominant land taker. New housing zones are needed due to the growth. Intensification of the existing areas will not compensate the demand of growth. The anticipated new areas for housing that will be needed by year 2040 is to have a land area of 18 000 ha. The density of the new areas should be higher compared to the existing low density areas. The gross floor space for residential use will grow from existing estimated 60 million sq m to 100 million sq m in the year 2040. Number of jobs within each zone is a prime determinant of travel. The land use interpretation gives an approximate estimation for industrial and institutional areas. Within the residential zones the number of service and commercial workers varies remarkably. In the Central Business District the job density is very high. In Low Density Residential zones the job density is very low. Some of the industrial workers have their job site outside the region. Based on the available information and the land use interpretation a job density model was created for the region. The total number of

jobs within the region is assumed to grow from existing 800 000 jobs to 1 200 000 jobs in 2040'.



Figure 30: Existing Land Use of Baku Metropolitan Region



Figure 31: Future Land Use of Baku Metropolitan Region for 2040

- **Public Transport Infrastructure;** Transport infrastructure that supports medium and long-distance travel generally between towns and cities or along major corridors in urban areas (Banister et. al, 2010)

There are 9 different transportation (Table 12) modes in Azerbaijan. The most important point for the international transportation is Baku because the main airport and seaport is in Baku. For the intercity transportation train and buses are

used; whereas in the city center mostly buses and taxis are used even though the city has a well developed metro system.

Table 12: Conveyance of Passengers in Transport Sector

4.1 Conveyance of passengers in transport sectors, 1000 passengers										
	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total	871.484	893.225	920.988	954.079	1.000.278	1.063.347	1.148.328	1.242.161	1.328.073	1.387.308
Railway	4.250	4.442	4.736	5.241	5.492	5.824	6.598	6.394	6.389	4.803
Sea	12	14	13	20	17	17	14	14	10	12
Air	701	732	867	1.094	1.211	1.332	1.526	1.396	941	1.017
Tram	2.427	1.135	453	-	-	-	-	-	-	-
Trolleybus	3.431	3.104	2.301	1.102	696	105	-	-	-	-
Metro	117.364	115.639	127.052	136.898	146.952	161.096	175.689	200.412	206.140	181.146
Road	743.301	768.159	785.566	809.725	845.910	894.973	964.501	1.033.945	1.114.593	1.200.330
bus	720.881	746.633	763.608	786.515	821.122	867.926	933.889	1.000.194	1.076.509	1.158.324
taxi	22.420	21.526	21.958	23.210	24.788	27.047	30.612	33.751	38.084	42.006

Table 13: Transportation Modes for Intercity Trips

TRANSPORTATION MODE

INTERCITY



BUS TERMINALS IN BAKU



RAILWAY TERMINALS IN BAKU



AIRPORTS OF BAKU

The most important problem is the increasing car ownership in Baku. According to the Strategic Transportation Plan for the Baku Metropolitan Region (BMR); the developed model takes into account the estimated increase of car ownership in Baku region.

In European countries the car ownership varies from 400 to 550 cars per 1 000 inhabitants. It is assumed that the car ownership in Baku region will increase in the future years from the current 210 up to 400 by 2040. However, it is likely that the increase in passenger car trips will be to a certain extent slower. It is assumed that the 1 percent increase in car ownership will lead to 0.8 percent increase in passenger car trips. Today it is in a critical ratio as seen in Figure 32;

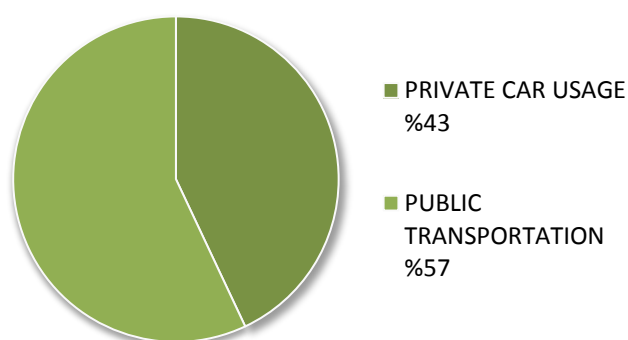


Figure 32: Public Transport Share

It should be noted that these car ownership and car usage levels are quite high when compared to developing countries: For example car ownership level in Turkey is about 70 cars per 1000 inhabitants; this ratio is only about 120 in Istanbul and 180 in Ankara. Car usage is also quite high in Baku in comparison: 43 % of motorized trips are made with the private car in Baku whereas this ratio is about 28% in both Ankara and Istanbul.

The transportation issues have been described in the Discussion Papers with a view to define the topics to focus on during the study and to design the way forward. As a backdrop, urbanization is a fast growing phenomenon in Azerbaijan. The resulting increase in economic activities and thus the rise in living standards bring about an increase in:

- travel by all modes
- private car ownership
- demand for public transport services

As of the late 1990's the steep growth of the Azerbaijan's economy was fully reflected in Baku experiencing severe problems in the city's transportation chain in common with most cities globally. For example between 2000 and 2008:

- The number of dwellings tripled
- Road passenger journeys more than doubled
- Private car ownership quadrupled
- The number of buses in service doubled

And as a result, the resulting congestion in the city creates multiple problems some of which are:

- Environmental, due to burning fuels
- Economic, due to wasted fuels
- Financial, due to the waste of man hours when working people are stuck in the traffic jam.
- Psychological, from the stress of being in congestion for both non-work and work trips.

As a result to get more sustainable transportation studies are done by government. Most important strategies to develop the transportation infrastructure are;

- Road Network Development Strategy
 - Coordination of the land use plans and road programs
 - Environmental Impact Assessment Policy
- Public Transit Development Strategy
 - Comprehensive joint development strategy for bus, metro and commuter train
 - Park and ride policy
 - Bus priority concepts, lanes, signals, stops
 - Baku ITS and bus system
 - Taxi services

- Car rental and car club services
- Procurement of low floor equipment

In the light of this information, the analysis of macro-scale criteria regarding sustainable form and transport reveals a mixed performance for Baku. According to Macro Scale Planning Policies that were described earlier in the literature chapter; planning for sustainable city and sustainable transport outcomes requires three main approaches (criteria): Compactness and prevention of urban sprawl; existence of sub-centers that can provide a mix of different land-uses and hence reduce the need to travel or reduce the distances to be travelled; and an extensive public transportation system.

- In terms of compactness, there is a mixed performance: the city used to be compact with a high density; however, it is experiencing sprawl now and compactness cannot be preserved as well as before.
- Sub-centers can help creating a mix of different land-uses and this issue is recognized as an important strategy in the plan document as cited above. On the other hand, these are not implemented yet; and the existing city center of Baku is still extremely strong where most residents travel to work.
- The city performs well in terms of public transport infrastructure. It has a good metro system and extensive bus services and they are studying to develop the transportation infrastructure to make it more sustainable.

It can be said that all these macro scale policies are important and relevant issues that should be considered in the planning of Baku. Apart from the transport infrastructure, the city does not perform that well in terms of the two issues regarding compactness and sub-centers.

5.2. MEZZO SCALE ANALYSIS



Figure 33: Amphitheater Plan Scheme of the Baku, 1927

In this part of the analysis Administrative Baku was examined to find how the city performs at this scale in terms of the principles of sustainable urban design.

Mezzo scale indicators are analyzed below;

- **Mixed-Land Use: existence of amenities and facilities together with residential areas**

Administrative Baku was planned as three main areas in 1927; residential area, industrial area and administrative area. Industrial area was placed through the wind direction which is south-east. As a result wind can clean the air caused by industry. Residential areas were placed in the sides of the area where the wind is not as strong. While residential areas were adjacent to the administrative areas and industry, the two main working areas in the city, this planning of different zones for each land-use is different from the mixed-use strategy that has been discussed in this study.

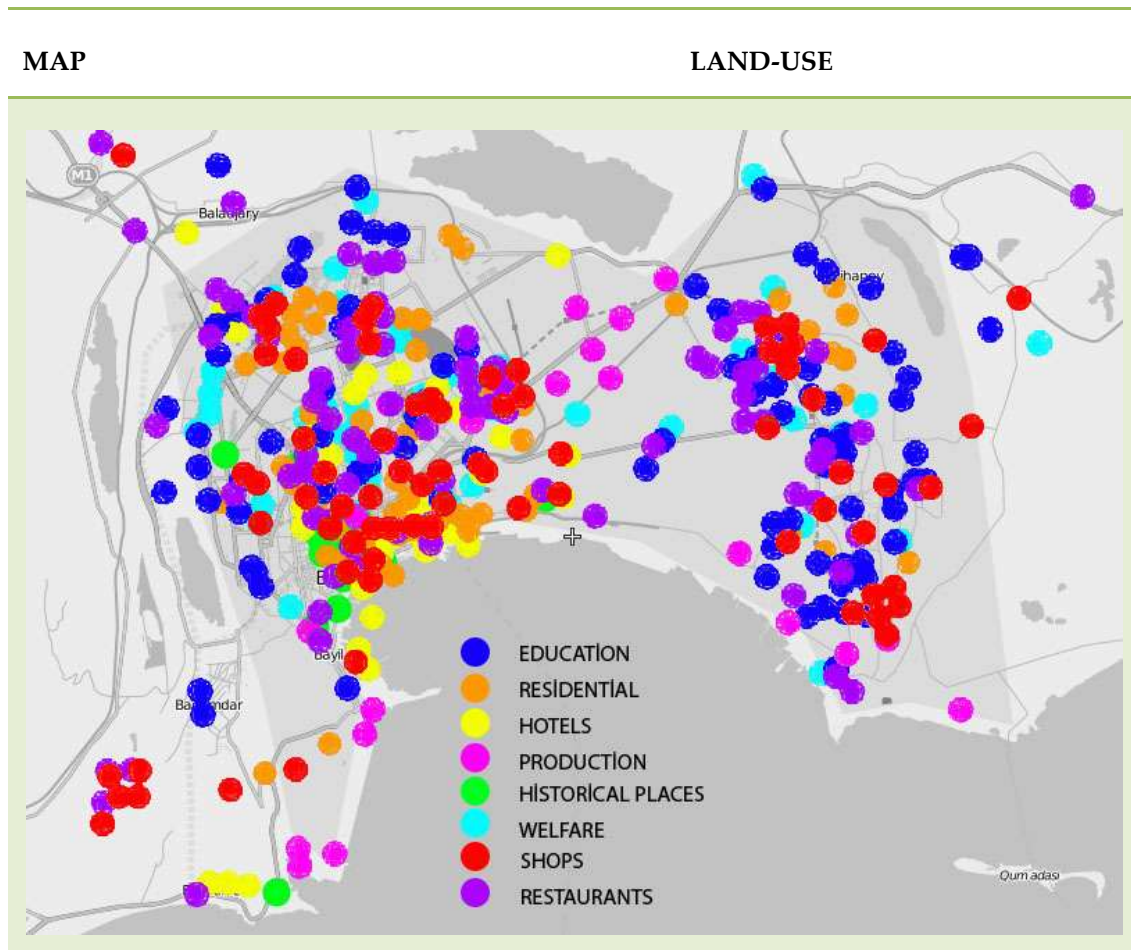
Today, however, Baku Administrative has multi-functional areas such as multi storied buildings, industrial areas, educational areas, institutional areas etc. (Figure 28). They are now better mixed with residential areas. In Table 14 detailed mixed-use activities are given;

Table 14: Mixed-Use Development of Baku Administrative	
MAP	LAND-USE
	HOUSES
	HOTELS
	HOSPITALS
	PRODUCTION/FACTORIES

Table 14 Continued

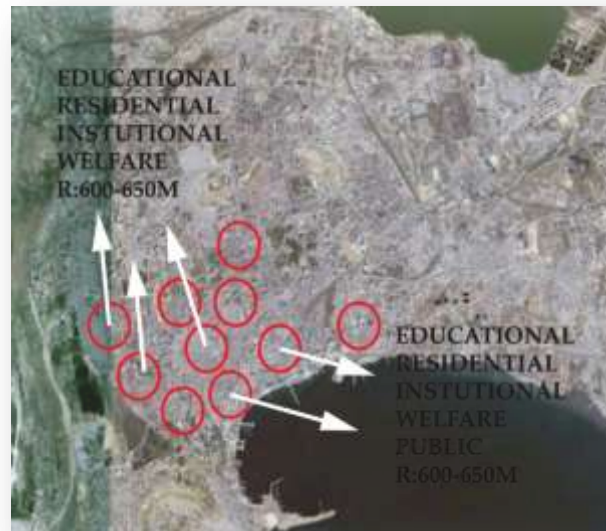
MAP	LAND-USE
	EDUCATION/UNIVERSITIES AND SCHOOLS
	SHOPS
	RESTAURANTS
	HISTORICAL PLACES

Table 14 Continued



- **Pedestrian Friendly and Walkable Development:** In land use planning and policies the appropriate distances are defined as 5 minute walk or distances of 400 to 600 meters. Besides, Calthorpe defined it as a mixed-use community within an average 2000 foot (approximately 600m) walking distance.

There are catchment areas within the approximately 650m distances in each approximately 2 km. Each area is served with public transportation modes in a walking distance and well served for need of daily facilities by having educational, welfare and commercial units.



- Well served public transportation: efficient public transportation system and urban development focused on public transport stations

There are three main public transportation systems in Baku Administrative which are; underground subway, bus and railway. In the 1960s an electrified railway system was also designed but it is not used for nearly 10 years. Funicular was also designed in the 1960s and it is still used in south-east corner of the bay.

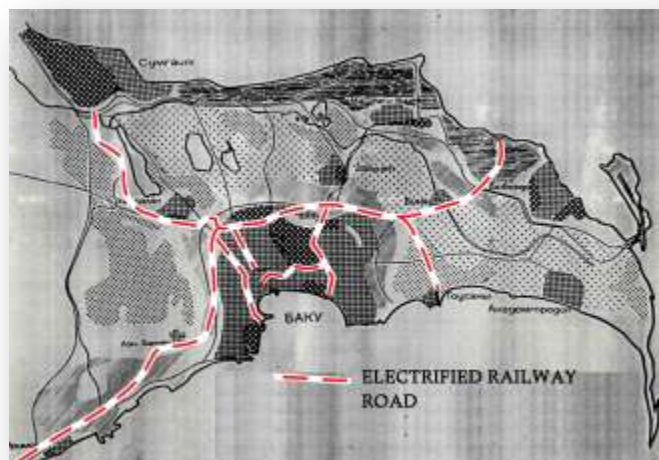


Figure 35: Trolleybus Plan 1980's



Figure 36: Electrified Rail System 1969



Figure 37: Baku Funicular

The most important and most effective transportation system is underground subway system which started in 1967. It has a station every 1 km and provides access to the whole Baku Administrative area. According to the Strategic Transportation Plan for the Baku Metropolitan Region (BMR); “the metro should support the goals of sustainable transportation development in Baku related to land use strategies. Based on the strategic land use plans the Metro lines towards Hovsan

and towards Lokbatan are important connections. Additionally the extension of the line from Dernegul to Azizbeyhov and further to Qaracuxur could be extremely feasible. The north south line could be extended to Digah new zone around the lake Boyuk Sor Golu and in the south west the line should be extended through the new Sabail coastal zone to Lokbatan.”



Figure 38: Baku Subway/Metro Map

In general there are well-designed public transportation structures in Baku. There are metro stations in every 1km of the city and there are bus stops with the distances between nearly 350m. According to the universal standards distances of 500m is ideal for the pedestrian to walk. The transportation stops and stations are shown in the following table:

Table 15: Transportation Modes of Baku Administrative

MAP	STATIONS
	Bus Terminals There are metro stations close to the bus terminals
	Bus Stops The distance between in the stations is approximately is 350 m and the stations are located close to the activity areas.
	Rail Stops The railway system can be used to reach to the areas that has not the metro stations
	Metro Stops The distance between the stations is 1km and it serves all the areas of Baku administrative

On the other hand, increased car ownership and decreased demand for public transportation causes traffic congestion because streets cannot hold that traffic. According to the 2010 -2011 statistics as shown in Table 16 and Table 17 private car

usage ratio is higher than public transport use and private car number in the city is as much as number of public transportation vehicles.

Table 16: Public Transportation Usage vs. Private Car Usage (The State Statistical Committee of the Republic of Azerbaijan)

2010 JANUARY-DECEMBER / 1000 person	
METRO USAGE	181146,3
CAR USAGE	511714,8

Table 17: Public Transportation Usage vs. Private Car Usage (The State Statistical Committee of the Republic of Azerbaijan)

2011 JANUARY-MARCH / 1000 person		
METRO USAGE	43659,2	%97.5
CAR USAGE	134696,4	%105.3

Table 18: Public Transportation vs. Private Car Ownership (The State Statistical Committee of the Republic of Azerbaijan)

2009	
PRIVATE CAR OWNERSHIP	444514
PUBLIC TRANSPORTATION	472458

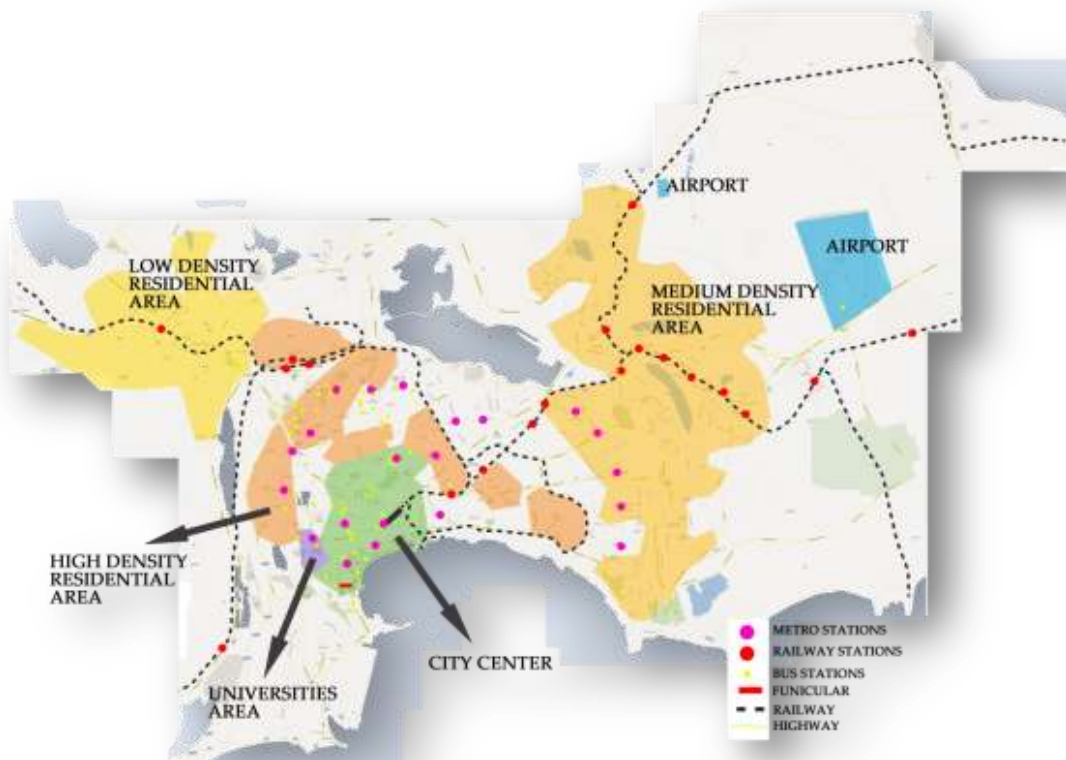


Figure 39: Accessibility of Transportation Modes of Baku

- **Grid system plan; to ensure high connectivity and walkability in the micro scale**

Another important transport infrastructure issue is the grid plan system. The first area development of Baku is the old city inside the castle designed in 1822 and it was the first grid iron planned city of Baku. According to a publication called 'What I Heard, What I Read, and What I Saw' architects from Europe were coming to the city to see the plan development of the Castle. In 1918 when city grew outside of the castle it continued to be designed in a grid plan system.

Table 19: Baku Master Plans

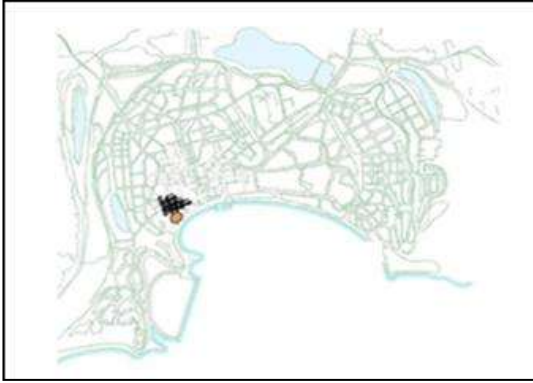
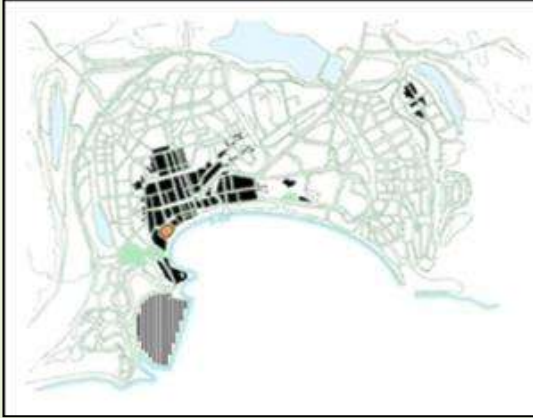
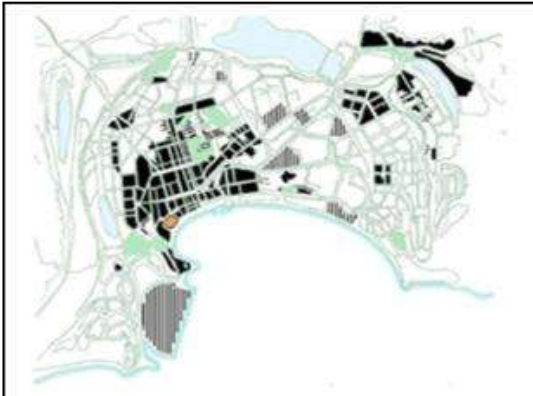
MAP	YEAR
	1822 1500 inhabitant
	1854 18 600 inhabitant
	1918 312 700 inhabitant

Table 19 Continued

MAP	YEAR
	1940 791 200 inhabitant
	1960 967 600 inhabitant
	2005 1 873 600 inhabitant

The grid plan system can be clearly seen in the plan approved in 1981 too. This grid plan is particularly emphasized here because grid system is accepted to create more walkability as discussed in the literature. It was noted as one of the mezzo scale criteria of planning for more sustainable patterns.



Figure 40: Grid Plan of the Baku 1987

In the light of the discussions, Baku is evaluated against the mezzo scale criteria and policies as shown in Table 5 . Accessibility is high due to the extensive metro and bus network. The grid plan system also increases pedestrian accessibility as mentioned further below. Mixed use development is encouraged and taking place as described above..

As mentioned before, grid system is a positive feature of the Baku development pattern since it supports walkability. In terms well served public transportation, as there are at least two modes of transport stations around the neighborhoods or activity areas, there is an effective public transportation system. All those modes are close enough to walking, for example there are bus stations in each 350 m, and all designed pavements provide the needs of pedestrians by being at least 5 meter wide and divided with the green borders from the roads (as described below in the Micro Scale Analysis). Therefore it performs well enough in the aspect of the pedestrian friendly and walkable development.

5.3. MICRO SCALE ANALYSIS

In this part of the analysis Baku Center is examined. Private Baku or Baku Center is the oldest development area of Baku. As mentioned above the first planned area is the Old City inside the Castle. After castle lost its defense importance, areas surrounding the castle were started to be used. The sea side in front of the castle was used as a warehouse for the port. Sea shore/port became used as a trade center. At first, designed as a residential area, Baku center today has a mixed-use development comprising housing areas, schools, hotels, hospitals, etc (Table 14) and it has well served public transportation system which close to the activity areas and locate in distance to be able to walking as explained in Table 15.

For a more comprehensive study, three routes were selected for an in-depth analysis as shown in Figure 41. The first route is a trip going through the old residential area, Yeni Yasamal. The second route starts from a new residential area towards the city center and the last route starts from the main railway station and ends in the city center. All three routes were studied by walking with making sketches and taking photos.

Areas were analyzed according to the sustainable urban design indicators that were studied in the literature and refined in the method of the study. The study tries to answer the following questions: how is the intensity of the street network; is there an approach on mixed-use area development; is the area well served by public transportation; is there any awareness regarding pedestrian friendly design; how is the interface with car parking handled; is there a grid system plan to enhance connectivity for pedestrians; are there any car-free pedestrian areas and is the majority of the city walkable?

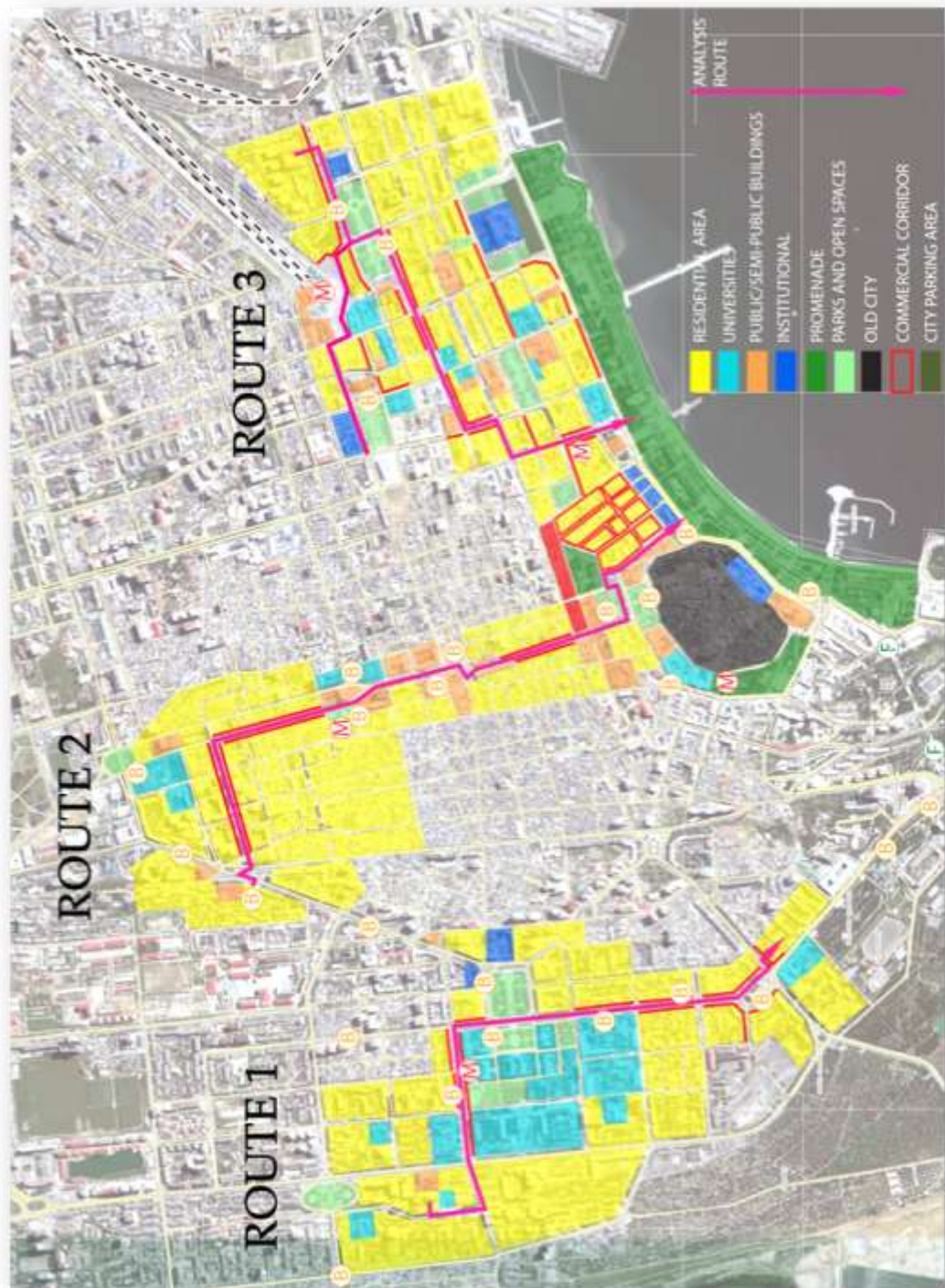


Figure 41: Three Route for Analysis

5.3.1.ROUTE 1; YENI YASAMAL RESIDENTIAL AREA

Yeni Yasamal is the oldest residential area of Baku. While city center was designed for the higher income residents in the first plan, Yasamal was designed for the middle income population. Planned with courtyards in the middle and not being more than 5 stores, these buildings also consist of commercial usage in facades facing the street.

Table 20: Yasamal Region Analysis

INDICATORS	FIGURES	NOTES
INTENSITY OF STREET NETWORK		The intensity of street network is not as high when compared to the two other areas analyzed below. Housing plots are very large. But the grid plan provides a certain intensity
LOCAL SERVICES AND AMENITIES (MIXED-USE)		There are residential areas, universities areas, institutional areas and commercial streets

Table 20 Continued

INDICATORS	FIGURES	NOTES
WELL SERVED PUBLIC TRANSPORT MODES		There are bus stops in every 350 m There is also a metro station inside the area
GRID SYSTEM PLAN		Baku has a grid plan and this residential area also has a grid system which makes it walkable for residents.
PEDESTRIAN FRIENDLY AND WALKABLE STREET SECTIONS		Even though there are not specifically designed spaces only for the pedestrians inside the housing area, there are pleasant, appropriate pedestrian sidewalks.

Table 20 Continued

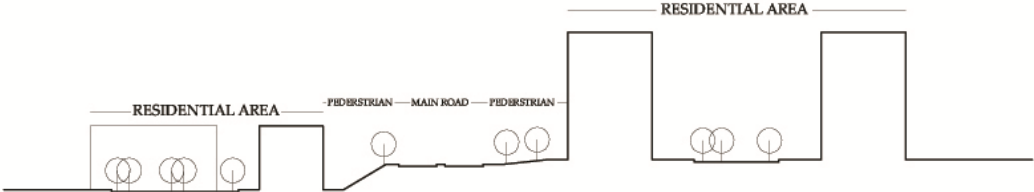
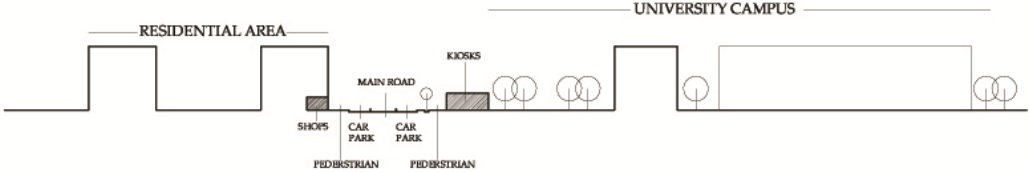
INDICATORS	FIGURES	NOTES
PEDESTRIAN FRIENDLY AND WALKABLE STREET SECTIONS		
		
		Along the universities area there is well designed pedestrian sidewalk
		

Table 20 Continued

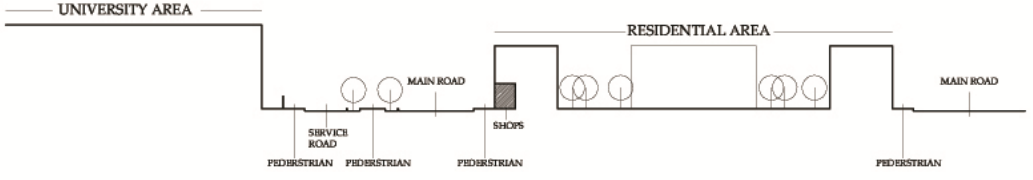
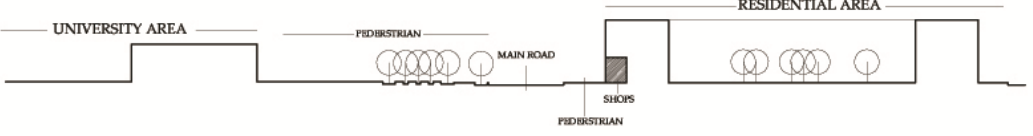
INDICATORS	FIGURES	NOTES
		
		Along the main road, streets are protected from the air and sound pollution with green belts
		
INTERFACE WITH PARKING		
		Interface between pedestrians and parking is badly designed: Along the universities area there are parking areas that cause congestion because they are not enough, but more importantly they act as a barrier to pedestrians

Table 20 Continued

INDICATORS	FIGURES	NOTES
INTERFACE WITH PARKING		Inside the old residential courtyards there are parking lots that reduce the quality of space and create a badly designed interface
ACCESSIBILITY ON FOOT		Approximately 2km distance analyzed by walking

5.3.2.ROUTE 2; NEW RESIDENTIAL AREA TO THE CITY CENTER

Baku does not have a new Master Plan. That is why all new buildings are constructed in the empty areas of the 1987 plan (infill development) or in the old building areas which are about to collapse. One of these new areas is analyzed below:

Table 21: New Residential Area Analysis

INDICATORS	FIGURES	NOTES
INTENSITY OF STREET NETWORK		The intensity of street network is much higher compared to the first area analyzed above. Even though area plots are large the frequently planned housing patterns and the grid plan provides a certain intensity
LOCAL SERVICES AND AMENITIES (MIXED-USE)		There are residential areas, universities areas, institutional areas and commercial streets

Table 21 Continued

INDICATORS	FIGURES	NOTES
WELL SERVED PUBLIC TRANSPORT MODES		There are bus stops in every 350 m There is also a metro station inside the area
GRID SYSTEM PLAN		Baku has a grid plan and this residential area also has a grid system which makes it walkable for residents.
PEDESTRIAN FRIENDLY AND WALKABLE STREET SECTIONS		There are many commercial uses at the facades, that's why there are well designed pedestrian streets

Table 21 Continued

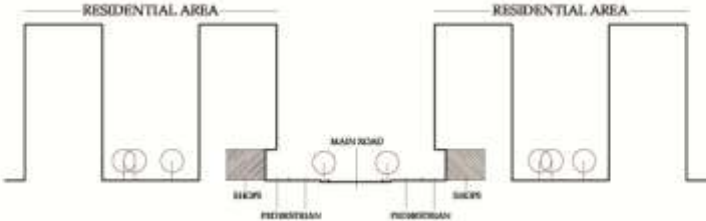
INDICATORS	FIGURES	NOTES
PEDESTRIAN FRIENDLY AND WALKABLE STREET SECTIONS		
		
		In general there are well designed pedestrian areas. Pavements are at least 5 m wide and divided with the greenery from the road Being an old part of the city, architecturally valuable and sensitively designed buildings and commercial stores under the building make the street more enjoyable when walking.

Table 21 Continued

INDICATORS	FIGURES	NOTES
A HIERARCHY OF NARROW STREETS, BOULEVARDS AND ALLEYS		Even though there are huge boulevards at some parts of the city, they consist of the main axes of the transportation system.
		In those areas, there are well designed areas, 5 m wide pavements divided with the green from the road, commercial facilities under the building. As a result those huge boulevards do not negatively affect the neighborhood so much.
		Underpasses are not ideal ways of designing access for pedestrians; however along those large boulevards in the centre these underpasses are well designed. As a result pedestrians do not have a problem to pass across.

Table 21 Continued

INDICATORS	FIGURES	NOTES
		
In general, along those boulevards there are huge public spaces with cultural activities or leisure activities designed with quality architectural materials. This approach also reduces the negative effect of those huge boulevards.		
		Behind the large boulevard there are narrow, green and architecturally well designed streets. But because of the high car ratio it is uncomfortable for the pedestrians.
		

Table 21 Continued

INDICATORS	FIGURES	NOTES
INTERFACE WITH PARKING		Inside the residential area there are not specifically designed places for the parking, there are only on-street parking, which create chaos and congestion. Inside the old residential courtyards there are parking lots that reduce the quality of space and create a badly designed interface
		Inside the city center there are serious parking problems and illegal parking practices. Parking control appears to be weak.
		

Table 21 Continued

INDICATORS	FIGURES	NOTES
ACCESSIBILITY ON FOOT		Approximately 2km distance analyzed by walking

5.3.3.ROUTE3; FROM TRAIN STATION TO CITY CENTER

Baku railway system was the most used transportation system but today it is not used as much as it is used to be. Around the main station there are residential, commercial and educational areas.

Table 22: From Train Station to the City Center Analysis

INDICATORS	FIGURES	NOTES
INTENSITY OF STREET NETWORK		The intensity of street network is the highest compared to the two other areas analyzed above as it is in the city center.

Table 22 Continued

INDICATORS	FIGURES	NOTES
LOCAL SERVICES AND AMENITIES (MIXED-USE)		There are residential areas, schools, institutional areas and many commercial streets
WELL SERVED PUBLIC TRANSPORT MODES		There are bus stops in every 350 m There is also 2 metro station inside the area
GRID SYSTEM PLAN		This areas also has a grid plan – hence easy to understand and access for pedestrians

Table 22 Continued

INDICATORS	FIGURES	NOTES
PEDESTRIAN FRIENDLY AND WALKABLE STREET SECTIONS		In general, in the city center there are well designed pedestrian streets/areas
		Pavements are at least 5 m wide and divided with the greenery from the road
		Being an old part of the city, architecturally valuable and sensitively designed buildings and commercial stores under the building make the street more enjoyable when walking.
		

Table 22 Continued

INDICATORS	FIGURES	NOTES
A HIERARCHY OF NARROW STREETS, BOULEVARDS AND ALLEYS		There are huge boulevards in some part of the city. But those boulevards are the main axes of the transport infrastructure and pass outside of the city center.
		
		Underpasses are not ideal ways of designing access for pedestrians; however there are large boulevards in the centre and it can be said that these underpasses are well designed.
		
		

Table 22 Continued

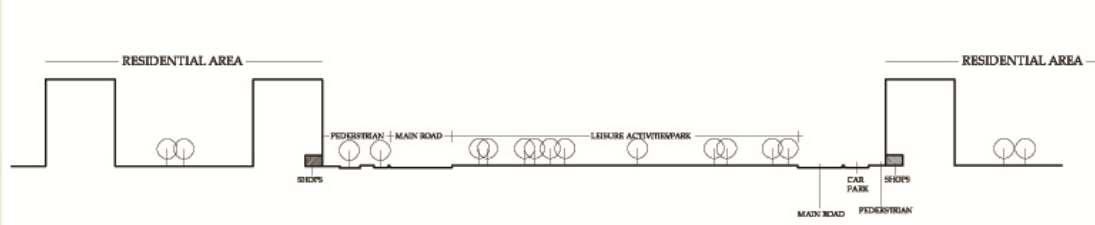
INDICATORS	FIGURES	NOTES
		
		
	In general, along those boulevards there are huge public spaces with cultural activities or leisure activities designed with quality architectural materials. This approach also reduces the negative effect of those huge boulevards.	
INTERFACE WITH PARKING		Inside the city center there are serious parking problems. There are not specifically designed places for parking; this street parking system negatively affects the pedestrians when walking as it blocks the passing.

Table 22 Continued

INDICATORS	FIGURES	NOTES
ACCESSIBILITY ON FOOT		Approximately 2km distance analyzed by walking

The analysis above has been carried out by studying maps, experiencing the city by walking, making sketches and taking photographs. Seven main principles have been considered according to the sustainable urban design principles as seen in Table 4 while analyzing. The analysis can be concluded as below;

- **Intensity of street network;**
 - In Yasamal district, there are large plots of areas as it has universities and residential areas which have huge courtyards among them. As a result the intensity of the street network in the area is quite low but the grid system provides certain intensity.
 - In New Residential district, the intensity of street network is much higher compared to the first area. Even though area plots are large the frequently planned housing patterns and the grid plan provides certain intensity.
 - In last analyzed area the intensity of street network is the highest compared to the two other areas analyzed above as it is in the city center.
- **Mixed-use development:** all three areas that were analyzed were designed as multi-functional areas by having residential neighborhood, universities

campuses, institutional buildings, primary schools, academy areas, commercial areas under the buildings and leisure places as huge parks.

- **Well served with public transport:**
 - For the first route; in an approximately 2.4km long and 700m wide area, there are 3 main underground subway stations, and 6 bus stops.
 - For the second route; in an approximately 2km long and 500m wide area, there are 3 main underground subway stations and 12 bus stops.
 - For the third route; in an approximately 1.5 km long and 300 m wide area, there are 2 main underground subway stations and 4 bus stops

Transportation modes serve the areas well and effectively by being close to the activity areas. In other words it is available to access to a public transport mode in every 350-400 m which is defined an average 2000 foot (approximately 600m) walking distance for mixed-use community that showed in Figure 4 to transit stops and centers (Shaoming, 2005).

- **Grid system plan:** as mentioned before, Baku has been planned with a grid plan system since the first Master Plan in the 1800s.
- **Pedestrian friendly and walkable street sections:** the majority of the city is designed with a consideration of pedestrian and walkable attitude. Pavements are at least 5 m wide and have a green border between roads. Narrow street section through the center and having commercial activities along the streets under the buildings make walking enjoyable.
- **A hierarchy of narrow streets, boulevards and alleys:** even if there are huge boulevards at some parts of the city, they mostly occurred with the intersection of the main avenues and continue with the huge promenades as seen in Figure 42. Behind those boulevards, inside of the city center, there are narrow streets but because of the huge amount of private car passage they cannot be used as comfortably as they were originally designed.

HUGE BOULEVARDS AROUND THE HUGE PROMENADES

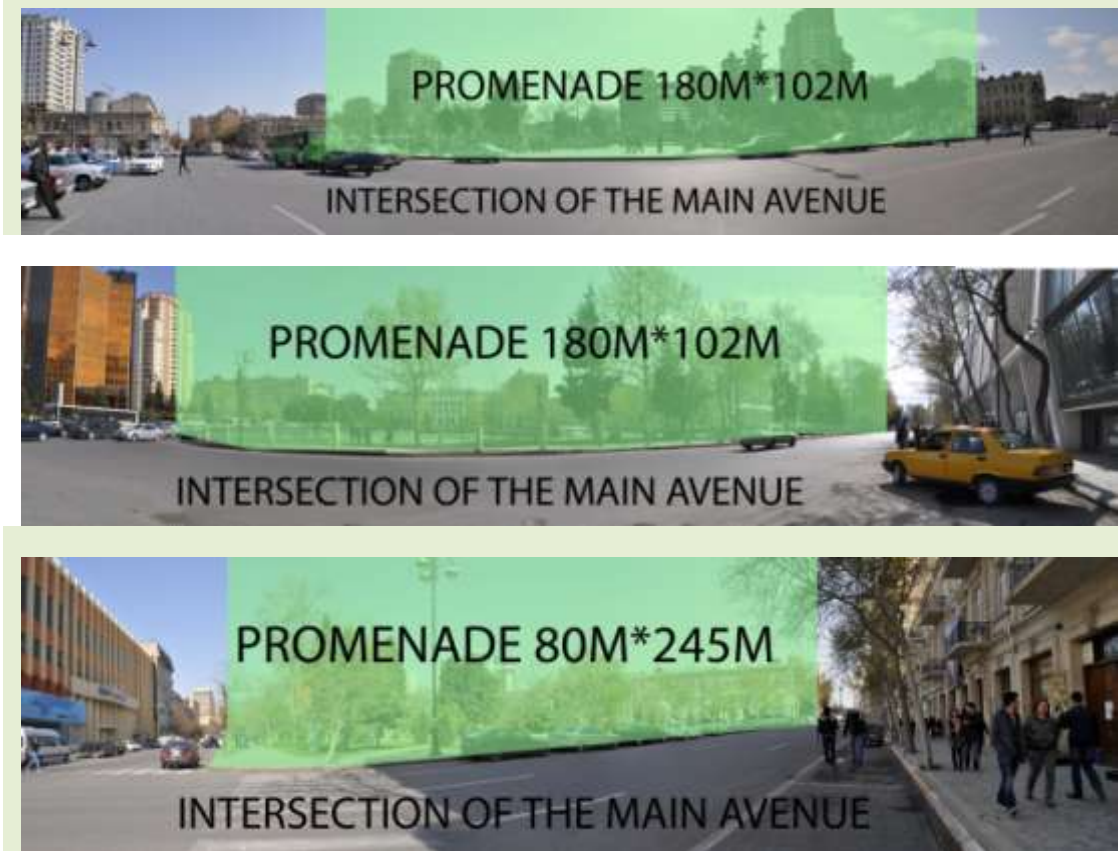


Figure 42: Huge Boulevards around Huge Promenade

- **Interface with Parking:** there is a huge parking problem in Baku even in the new residential areas. In the city center there is not any designed area for parking, therefore there is disruptive street-parking. Around the new residential areas, although there should be a closed garage in the basement, there is still on-street parking between the buildings.
- **Neighborhoods accessible on foot:** Baku city center is designed as a mixed-use development. Streets are well designed by considering pedestrian comfort and safety. Having commercial and leisure activities on it progressively and with the impressive architectural assets the city center is enjoyably and accessible on foot.

- **Car-free public areas:** one of the most important aspects about the city is its huge pedestrian promenades. Throughout the Soviet Azerbaijan in the 1930s architects planned to increase the green and open areas which were 20-25 hectares to the 600-700 hectares within the 30 years. There are three main car-free pedestrian areas in the Baku center:
 - The first one is the Bulvar. The biggest promenade designed in 1910 as seen in Figure 18 was 3km long and 68m wide in 1937. Today it is 3km and 180 m wide and it is a completely car-free pedestrian area as seen in Figure 43 and served as mostly leisure, entertainment area and then commercial area. It has a huge public car parking area just in front of it, on the road called Freedom Square.
 - The second one is Tarqovi Street which is the biggest commercial area of the Baku as well as served as leisure area and reach to the Bulvar. Private car entrance here is prohibited and it has a public car parking area just beside in front of the Castle of Inner City.
 - The last one is the old and ancient city, Inner City within the Castle Walls.

CAR-FREE PEDETRIAN AREAS



Figure 43: Car-Free Pedestrian Areas

BULVAR/PROMENADE



TARQOVI STREET



INNER CITY



Figure 44: Bulvar, Tarqovi Street and City in the Castle

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The starting point of this study was to analyze one of the most current debates in the literature that is how to design urban areas in order to create sustainable transport outcomes and travel patterns. A number of planning movements emerged focusing on this issue and they proposed urban design principles for more sustainable urban areas and urban transport. These, however, mostly originated in West Europe and North America and studied cities from those areas. The main aim of this thesis, therefore, was to find whether these principles and planning approaches are also valid for the planning of cities outside Europe and America, where planning background and resulting urban form and pattern might be very different. The literature review on sustainable urban design issue was carried out to find out the common principles to be able to create a checklist that can be applied to the selected case study. These principles are explained below as a summary of the literature.

6.1. SUMMARY OF THE LITERATURE

In this study, vast literature of sustainability was searched with the aim to find out the most important and common strategies to make urban areas and urban transport more sustainable. The literature review brought in particular the principles of three main planning movements or strategies that have been introduced for planning more sustainable cities, which are New Urbanism, Smart Growth and Transit Oriented Development.

New Urbanism is a strategy for the new development to creating livable, walkable and sustainable communities to raising the quality of life. It is basically related with designing transit oriented, traditional neighborhood structures, mixed used, walkable communities. The most common principles of New Urbanism are;

Table 23: Principles of New Urbanism

NEW URBANISM	
Walkability	▪ 10-minute walk of home and work ▪ Pedestrian friendly street design
Connectivity	▪ Interconnected street, grid network ▪ A hierarchy of narrow streets, boulevards, and alleys ▪ High quality pedestrian network
Mixed-Use & Diversity	▪ A mix of shops, offices, apartments, and homes ▪ Mixed-use within neighborhoods, within blocks, and within buildings ▪ Diversity of people; ages, income levels, cultures, and races
Mixed Housing	▪ A range of types, sizes and prices in closer proximity
Quality Architecture & Urban Design	▪ Emphasis on beauty, aesthetics, human comfort, and creating a sense of place; ▪ Special placement of civic uses and sites within community ▪ Human scale architecture & beautiful surroundings
Traditional Neighborhood Structure	▪ Discernable center and edge ▪ Public space at center ▪ Importance of quality public realm; public open space designed as civic art ▪ Uses and densities within 10-minute walk ▪ Transect planning: Highest densities at town center; progressively less dense towards the edge
Increased Density	▪ More buildings, residences, shops, and services closer together for ease of walking to enable a more efficient use of services and resources, and to create a more convenient, enjoyable place to live
Smart Transportation	▪ A network of high-quality trains connecting cities, towns, and neighborhoods together ▪ Pedestrian-friendly design that encourages a greater use of bicycles, rollerblades, scooters, and walking as daily transportation
Sustainability	▪ Minimal environmental impact of development and its operations ▪ Eco-friendly technologies, ▪ Energy efficiency, Less use of finite fuels, More local production ▪ More walking, less driving

Smart Growth is an issue based on growth management. It is related with the local, regional, state and federal plans and legislation. The aim of the smart growth is to promote non-sprawl, compact, transit oriented, walkable land use or new town development include, neighborhoods schools, complete streets and mixed-use housing patterns and require adequate public facilities to be available at the time of development. The most known principles of the Smart Growth are;

Table 24: Principles of Smart Growth

SMART GROWTH	
Non-Sprawl	▪ Control and prevent dispersal of development
Compact Communities	▪ Attract more people and business ▪ Reduce urban sprawl and protecting the climate
Mixed-Land Uses	▪ Create a range of housing opportunities and choices
Transit Corridor	▪ Provide a variety of transportation choices
Transit Oriented Development	▪ Residential or commercial area designed to maximize access to public transport ▪ Mixed-use/compact neighborhoods tend to use transit at all times of the day
New Town Development Pattern	▪ Foster distinctive, attractive communities with a strong sense of place
Availability of Adequate Public Facilities	▪ Preserve open space, farmland, natural beauty, and critical environmental areas

Transit Oriented Development is another recent planning movement in creating vibrant, livable communities. Also known as Transit Oriented Design, or TOD, it is the creation of compact, walkable communities centered on high quality train systems. This makes it possible to live a higher quality life without complete dependence on the car for mobility and survival. The most common principles of the Transit Oriented Development are;

Table 25: Principles of TOD

TRANSIT ORIENTED DEVELOPMENT	
▪ Area being well served with public transportation ▪ Transportation nodes close to the neighborhoods and centers ▪ Pedestrian and environment friendly transportation design; green transportation ▪ Mixed-use and compact development	

When all these concepts are analyzed four basic principles have been realized that sustainable urban area principles connected with four main approaches which are, Land Use Management, Transportation, Social Interaction and Environment. The purpose is to reduce the travel distances between the daily facilities while saving the time, design more green and walkable spaces and present quality of life by reducing traffic and accordingly reducing stress.

A major outcome and component of all these planning approaches is sustainable transportation, which is an expression of the Sustainable Development and has a direct relation with the three pillars of the sustainable development that are environment, economy and society.

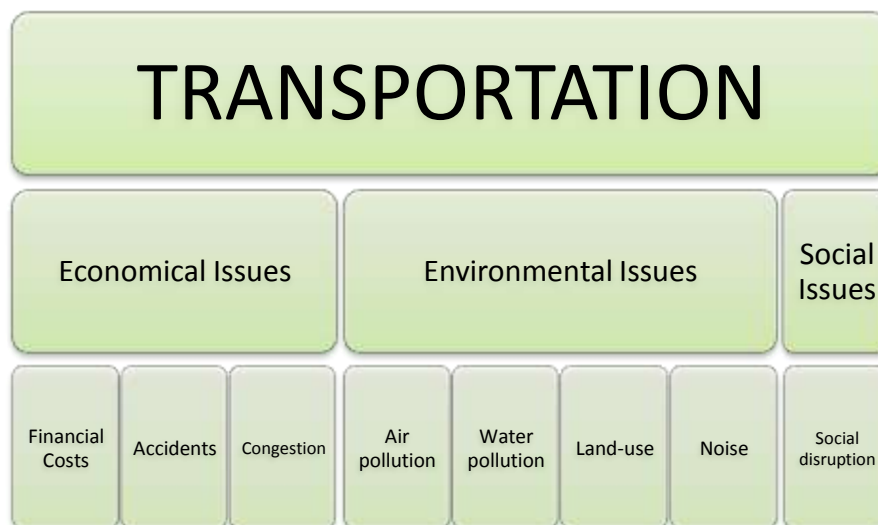


Figure 45: Effects of the Transportation on Three Pillars

Sustainable transportation promotes any kind of low impact transport which includes walking, cycling, transit oriented development, green transportation and fuel-efficient transport systems. The main idea for making more sustainable transportation is to reduce car-dependency in an urban area and encourage people to use public transportation and non-motorized transportation.

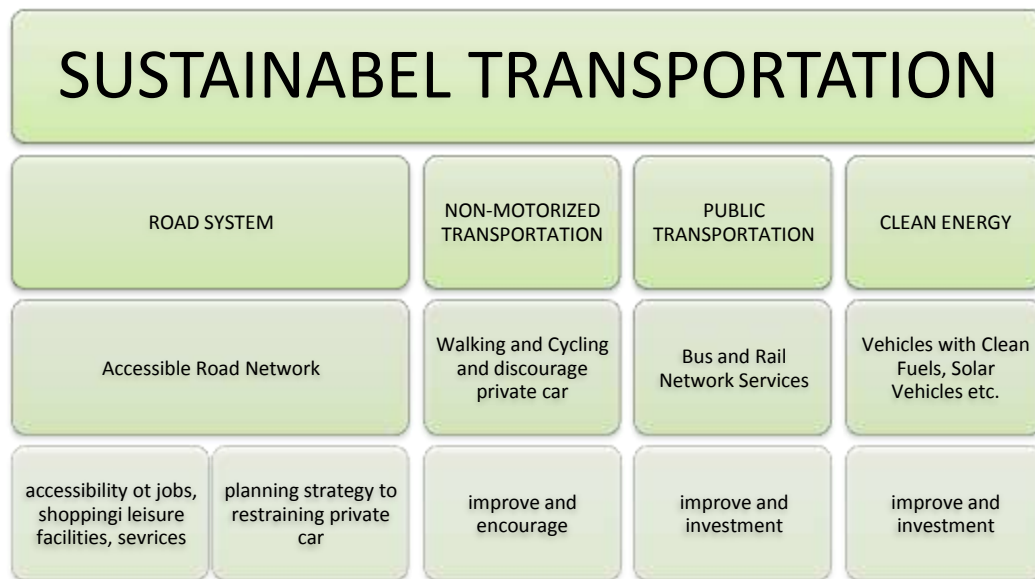


Figure 46: Principles for more Sustainable Transportation

According to the literature research, a list of common principles can be formulated to make an urban area and urban transport more sustainable. These planning and design principles can be categorized under three main scales of urban planning and design. In other words an urban area should be designed sustainably in both macro and mezzo scales and then micro scale. The case of Baku has been analyzed according to these three scales and sustainable urban design principles which are studied in the literature as seen in Table 6.

6.2. MAIN FINDINGS FOR THE CASE STUDY OF BAKU

The findings of sustainability analysis of Baku showed that Baku has retained its original development pattern, which was based on grid and provided walkability as well as good public transport accessibility to a certain extent. The main findings are as follows:

- Baku has a **mixed-use development**. In earlier plans the city had a distinct zoning of residential areas and industry as seen in Figure 27. However; there have always been local services and amenities within the residential developments. In addition, there has always been residential areas within the city center and administrative core area. Even within the castle there are both commercial and residential uses. After city began to grow it continued to consist of industrial areas, educational areas, business areas and institutional areas, recreation areas in close proximity to each other and in a mixed-use pattern.
- Baku traditionally had very **high density development** and this can be seen in both the city center (82,6 person/ha) and the housing areas (Yasamal District 115,7 person/ha) as seen in Table 11. On the other hand, both experts interviewed and the Strategic Transportation Plan indicates that the current trend is for low density housing and that low density development at the outskirts of the city is a major problem. Therefore; in terms of the density analysis, it can be said while Baku has a fairly high density built-up area in its inner city sections, the new developments at the fringes suffer significantly from low density growth. Nevertheless; the overall average density of 82,6 person/ha for the whole metropolitan regions is still higher than the 35 to 40 person/ha threshold suggested by Newman and Kenworthy (2006) and Banister (2008) as described earlier in the literature review section.

- Baku has an **effective public transportation system**:
 - It has had an electrified railway system since the 1960s (it is used as railway today) and it has been operating an underground subway (metro) since 1967. The metro system, which has 23 stations and 34.6 km length, efficiently serves the Baku administrative. Today, the government developed a new strategy for Great Baku by planning another 45 stations.
 - It has also an effective and extensive bus system as there are stops in every 350m approximately.
- In planning of the Baku street layout there is a concern for the **pedestrian friendly design**:
 - All pavements are wide enough for walking and separated with green border from the vehicle road.
 - There are commercial and leisure activities along the streets which encourages the walking.
 - Even though there are huge boulevards formed by the intersections of the main axes of the transport infrastructure, huge public spaces as cultural activities and parks and underground passages reduce the negative effect of those boulevards.
- Baku has had the **grid plan** system which is often described as one of the most important approaches for the sustainable urban design form. The city has had this approach since the 1898 Master Plan and protected its grid plan approach while enhancing the plan.
- All neighborhoods and special development areas like educational areas have at least two kinds of **transportation modes** like bus stops and underground subway station **close enough to walk**.
- City center layout is designed well enough to walk. Indeed three routes for the case study which are 2km long were analyzed by easily walking.
- There are huge pedestrian areas like boulevards and Tarqovı Street as leisure and commercial areas. These areas are completely **car-free areas**.

After an in-depth analysis of Baku, the following results can be shown:

Table 26: Analysis Result of the Baku Case

MACRO SCALE ANALYSIS	
Compactness of the urban form in metropolitan scale (restraining urban sprawl, setting growth boundaries, growth management, etc) and prevention of sprawl	+/-
Existence of sub-centers (a polycentric form that enables a mix of land-uses at macro scale and eliminates the need to travel to the city centre for daily needs or even for work purposes)	+
An extensive public transport infrastructure: efficient public transportation system	+
MEZZO SCALE ANALYSIS	
Mixed-land use	+
Pedestrian friendly, walkable development	+
Well served public transportation: efficient public transportation system and urban development focused on public transport stations	+
Grid system plan (to ensure high connectivity and walkability in the micro scale)	+
MICRO SCALE ANALYSIS	
Intensity of street network (to ensure high connectivity)	+/-
Existence of local services and amenities (mixed use)	+
Areas being well served with Public Transport	+
Grid Plan for high connectivity	+
Pedestrian friendly and walkable street sections	+
A hierarchy of narrow streets, boulevards and alleys	+/-
Interface with parking: parking areas should not be barriers for pedestrians	-
Having majority of the neighborhood accessible on foot	+
Car-free public areas	+

6.3. CONCLUDING REMARKS

According to this analysis, it can be said for certain planning principles and approaches, that Baku always had adopted those and preserved them, and therefore has a relatively more sustainable urban form and transport system. For example, mixed use development has always been an important strategy, and throughout its planning history, new developments in Baku have always been planned with their local services and amenities. In addition, boulevards with large sidewalks and protection of pedestrian pavements from the traffic with landscaping and green belts have been a long-lasting approach in planning in Baku. The adoption of grid-street patterns in most neighborhoods was another advantage that increased the interconnectivity and walkability, although some residential areas such as Yasamal which were designed in the period of Soviet Azerbaijan had less connectivity with large mass-housing style parcels and plots.

From all these perspectives, it could be said that the new urbanism, transit oriented design and similar approaches are not as relevant to Baku as they are to the cities of North America because Baku planners have always been aware of the advantages of these approaches and implemented them throughout the planning history of the city.

On the other hand, there are certain criteria or approaches that the analysis showed to be important for Baku:

Although development until recently has been in high-density, this is changing with the low density development in new residential areas. Hence there is the problem of sprawl; and therefore growth management should be an important strategy for Baku. The Transportation Strategic Plan also emphasizes this. In addition to that the interface of parking with sidewalks and pedestrians is a huge problem in Baku.

There are many large boulevards in the city and the city centre remaining from the Soviet period which are being further invested in today with fly-overs and junctions

to create better accessibility for cars. Hence there is the danger of creating a car-dominated system in spite of the advantages of the current urban form and design.

Car ownership and usage are high as described. Car ownership ratio is growing day by day because of the cheap sales of car industry. The city centre is not designed in a car oriented way and this is a positive thing. However, there are not enough traffic management approaches to prevent cars entering the city centre. Therefore in spite of the good design of the urban core, congestion and traffic problems are increasing.

As a result, approaches, such as growth management and the design of car parking areas may be important and relevant strategies for the Baku case.

What the Baku case shows, however, is that with the strong planning background of this city, planning and designing the city to make it more public transport friendly or walkable is not the priority. The city is already like this. It is the lack of any control on car traffic that is the problem. This problem can be solved with further design and pedestrianisation actions, but also with good traffic management including traffic calming measures.

6.4. RECOMENDATION

As mentioned above, even though there are pedestrian friendly, narrow green streets and commercial and leisure activities which encourage walking, the problem of free access of the private car negatively affects the pedestrians. The huge amount of the traffic jam in the city center is a big problem for the Baku mostly through the hours of commuting trips. To prevent that, government should block the private car entrance to the center. Indeed there is an effective public transport system such as bus and underground subway. If appropriate parking areas are designed outside the city center, and people are encouraged to use public transportation modes which are accessible enough, the problem of traffic jam can be reduced.

St. Petersburg is somewhat similar to Baku since it also has a city center with amphitheater plan structure like Baku. They have the same problem of the traffic jam in city center and they solve the problem by designing the main structural axis passing through the borders of the center as shown in Figure 47.

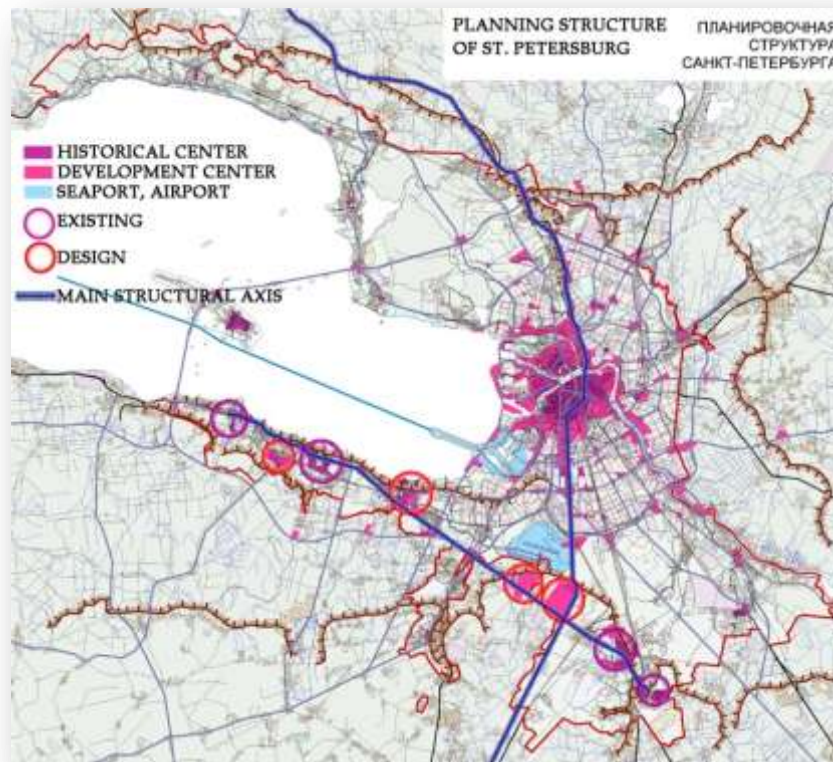


Figure 47: Planning Structure of St. Petersburg

Baku transport system can be developed with the same system to prevent the private car entrance to the city center and planning the main roads around Baku administrative with the appropriate public car parking areas.



Figure 48: Current Plan to Improve Urban Transport and Recommended Plan to Improve Urban Transport

However; sustainability is a much extensive issue as it is related to economy, environment and social life. As a result to achieve sustainable urban area, there need be sustainable in all three pillars of sustainability. But, as cities are the core areas of the development, in the first step, they need to be designed according to the sustainable urban design approaches. There is a vast literature, again, about that issue and the transportation is the key element to design a city. Although there are many policies to achieve more appropriate and sustainable transportation they are not well served if there is not an appropriate urban planning and design approach that encourages the use of sustainable modes of transport, such as walking, cycling and public transport.

6.5. FURTHER RESEARCH

In this study, an analysis framework has been developed to assess whether the urban form, network, and design of a city comprise aspects of sustainable urban form and design and therefore result in sustainable transport. There were three main steps to this analysis:

- Searching the literature about sustainable urban design and transport in order to reveal the main principles and strategies for planning and designing of urban areas for sustainable transport outcomes;
- Creating a check list based on these principles and strategies, as those that can make an urban area and its transportation more sustainable
- Analyzing a city by applying that check list with the help of:
 - Map analysis
 - Site survey through walking in selected sites
 - Taking photos and making sketches

However; the analysis revealed that in addition to the urban design criteria that has a vast impact on transport, policies regarding the management of traffic and particularly the restriction or reduction of car usage and car parking in central areas could be extremely important. This is especially the case when developing country cities are analyzed since they often lack the well established traffic management strategies and practices that are common in the cities of West Europe and North America. Therefore, to further develop the findings of this study, the state of transport regulations and management together with transport policies should also be included in similar analysis of cities from developed countries. This can also help understand the factors behind driver behavior as well parking behavior. This study can therefore be enhanced with such further studies that can incorporate urban transport policy and management into urban planning and design strategies.

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APPENDIX A

INTERVIEWS

1. **Novruz Eldarly;** The State Committee on Urban Planning and Architecture, Azerbaijan Republic, Greater Baku Regional Master Plan, Project Implementation Unit
2. **Yagubzade Yusif Oruj;** State Committee of Town Planning and Architecture, Azerbaijan Republic, Head of Urban Planning Department, Honored Architect of Azerbaijan
3. **Cafer Qiyasi;** Architect, Professor at Baku Architecture and Construction University, Department of Architecture
4. **Mr. Sahip;** Director of the Department of Constructing and Projecting of the Materials
5. **Fikret Huseynov;** Architect and Urban Designer, Professor at Baku Architecture and Construction University, Department of City and Planning
6. **A.M.Aliyev;** Director of the The State Statistical Committee of the Republic of Azerbaijan
7. **Umit Hasanov;** Expert at The State Statistical Committee of the Republic of Azerbaijan
8. **Turunc Quliyeva;** Director of the Department of Industry Transportation at The State Statistical Committee of the Republic of Azerbaijan

APPENDIX B

INTERVIEW QUESTIONS

Görüşme Yapılan Kişinin; Görüşme Tarihi/Saati ;
Adı-Soyadı : Tarih :...../04/2011
Görevi : Saat:
Telefonu :
e-mail :
Görüşme Yeri :

1. Kurumsal yapı nasıl işliyor?
 - a. Şehir Planlama Projelerini/Politikalarını uzmanlar mı yapıyor?
Değilse kimler yapıyor?
 - b. Ulaşım Planı Projelerini/Politikalarını uzmanlar mı yapıyor? Değilse kimler yapıyor?
 - c. Denetleyen ve onay veren uzmanlar mı? Değilse kimler yapıyor?
2. Kent Planlama Politikalarında aşağıda bahsi geçen ‘Sürdürülebilirlik’ kavramları dikkate alınıyor mu? Alınmıyorsa sebepleri neler? Alınmıyorsa Planlama Politikalarında sürdürülebilirlik adına hangi kavramlar dikkate alınıyor?
 - a. Yerleşim Büyüklüğü/Alanı Yoğunluğu (Settlement Size)
 - i. Mücavir alan içerisindeki toplam nüfus ve konut sayısı yoğunluğu; iş imkanı, alışveriş ve diğer aktivite imkanları, yüksek yoğunlukta toplu taşıma ulaşımını sağlar.
 - b. Stratejik Gelişim Alanları (Strategic Development Location)

- i. Yeni yerleşim alanları için alan seçimi; iş imkanlarının ve çeşitli aktivitelere ve toplu taşıma modlarına ulaşımın uygun olduğu yerlerin belirlenmesi gerekir. Merkezi olmayan alanların ve kavşaklara yakın alanların seçiminden kaçınılmalıdır.
- c. Stratejik Ulaştırma Ağı (Strategic Transport Network)
 - i. Kent alanı içinde, şehirler ve kentler arasındaki orta ve uzun yolculukları sağlayan ulaşım strüktürü. Ulaşım modları arasındaki birleşmeyi/bütünlüğü sağlayarak geliştirmek gerekir.
- d. Yoğunluk (Density)
 - i. Alanın farklı kullanıcılar tarafından kullanımı; toplu taşıma modları etrafında yoğunluğun artması
- e. Konut-İş Dengesi (Jobs-Housing Balance)
 - i. İş fırsatlarıyla işgücü nüfusu/iş-işçi ilişkisi; her bir işçiye bir iş en etkili denge oranıdır.
- f. Ana Aktivite Alanlarına Ulaşım (Accessibility Key Facilities)
 - i. Aktivite(alışveriş, iş, okul vs) alanlarına ulaşımın kolaylığı;
- g. Semt ve Sokak Düzenlemesi/Yaya Öncelikli Tasarım
(Neighbourhood and Street Layout/Pedestrian Friendly design)
 - i. Yürümeyi, bisikleti, toplu taşıma kullanımını teşvik etmek için grid sistem planlaması (bu ne kadar çalışıyor).
- h. Seyahat Talep Yönetimi (Travel Demand Management)
 - i. Araba kullanımını ve onun zararlı etkilerini azaltmayı hedefliyor.
- i. Araba Park Alanları (Parking)
 - i. İş alanları, konut alanları ve eğlence alanları gibi farklı kategorilere/alanlara ayrılmalı ve bu alanlar toplu taşıma modlarıyla ilişkili olmalı.
- j. Mixed-use, walkable communities

- i. Coğrafi bir bölgede farklı fasilitaslerin kullanımı/varlığı derecesi; bankaların , okulların, marketlerin konut bölgelerine yürüme mesafesinde yerleştirilmesi gerekir.
 - k. Yaya Yönelimli Gelişim Alanları (Pedestrian Oriented Development)
3. Ulaşım Planlama Politikalarında 'Sürdürülebilirlik' dikkate alınıyor mu?
- a. Çevre dostu ulaşım araçları mevcut mu? (Environmental Friendly)
 - b. Toplu taşıma halkın karşılayabileceği düzeyde mi? (Economical)
 - c. Toplu taşımada özürllü nüfus dikkate alınıyor mu? (Equitable)
 - d. Trafik sıkışıklığı var mı/yoğunluğu nedir? (Traffic Congestions)
 - i. Problemler
 - ii. Çözümler
 - e. Yaya güvenliği dikkate alınıyor mu? Neler yapılıyor? (Pedestrian Safety Transport)
 - f. Dengelenmiş Ulaşım Sistemleri (Balanced Transport System)
 - i. Araba kullanımına alternatif olarak; yürüme, toplu taşıma kullanımı, bisiklet kullanımı teşviki.
 - g. Transit Geçişli/Aktarmalı Komuniteler/ Semtler (Transit Ready Community)
 - i. Otobüs servisleri (Bus services)
 - ii. Hızlı otobüs aktarma noktaları (Bus rapid transit)
 - iii. Raylı sistemin geçerliliği/elverişliliği (Availability of rail service)
4. Toplu Taşıma Araçları/Sistemleri plan ve stratejilerinde dikkate alınan politikalar nelerdir?
- a. Kentte toplu taşımayı destekleyen politikalar var mı? neler uygulanıyor?
 - b. Yürümeyi, bisikleti destekleyen politikalar var mı? neler uygulanıyor?
 - c. Kentte otomobil kullanımını, özellikle kent merkezine yolculuklarda otomobil kullanımını azaltmaya yönelik politikalar var mı? neler uygulanıyor?

- d. Toplu taşıma ne kadarlık bir alanı kapsıyor?
 - e. Transfer noktaları arasındaki süre-mesafe nedir?
 - f. Toplu taşıma araçları halkın ihtiyacını karşılıyor mu?
 - g. Toplu taşıma araçları tercihi/teşviki konusu dikkate alınıyor mu?
 - h. İyi nitelikli toplu taşıma ne kadar önem taşıyor?
 - i. Motorlu yolculukların % kaç arabayla, %kaçı toplu taşıma ile yapılıyor? Kentte yürüme oranı %kaçtır?
 - j. Bunlar dışında varolan problemler nelerdir? Çözümlerinde neler dikkate alınıyor?
5. Kentsel Gelişimde/Büyümede neler dikkate alınıyor?
- a. Yukarıda bahsi geçen Sürdürülebilir Gelişim kriterleri göz önünde bulunduruldu mu? Değilse hangi kriterler göz önünde bulunduruldu?

APPENDIX C

THE FIRST MASTER PLAN OF THE BAKU



Figure 49: The First Master Plan of Baku

APPENDIX D

MASTER PLAN OF THE BAKU

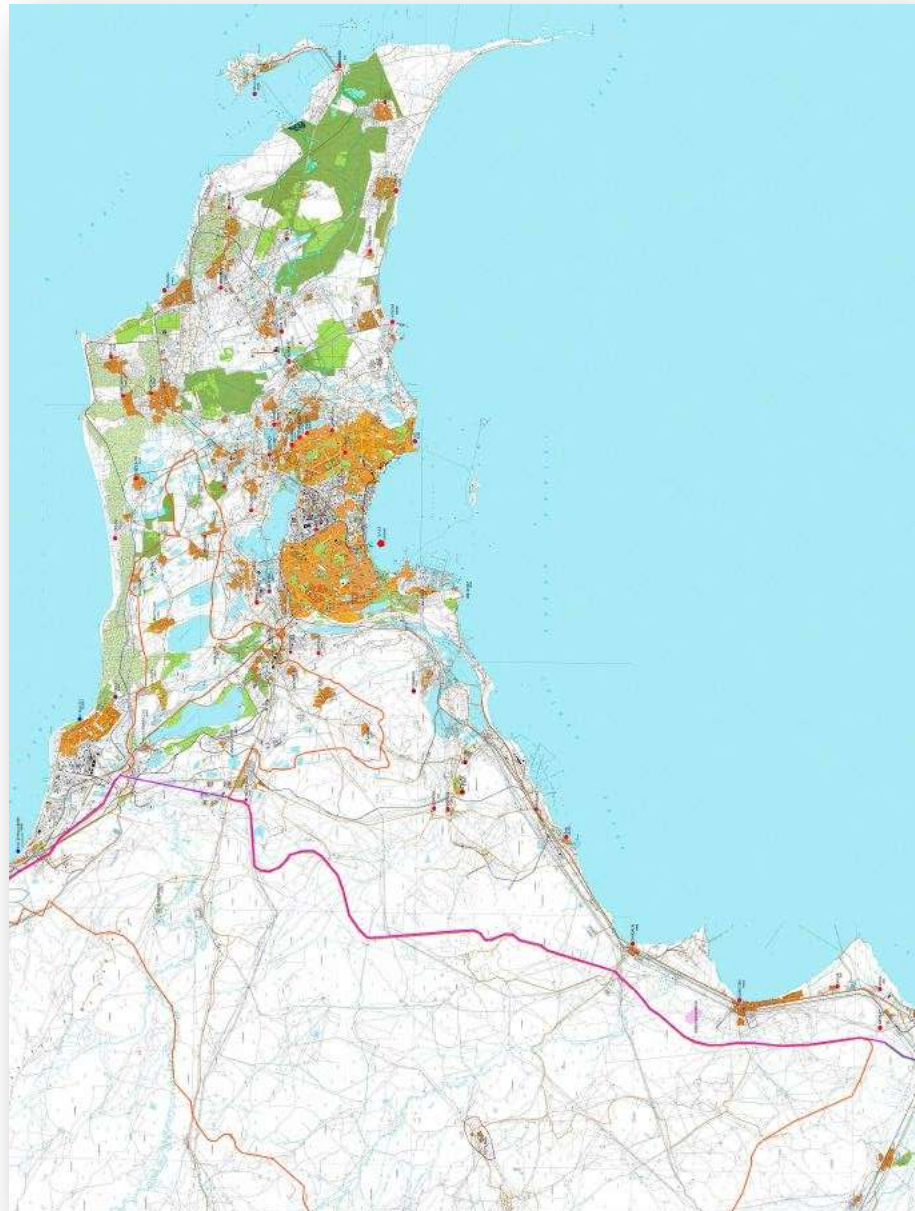


Figure 50: Master Plan of Baku

APPENDIX E

**GENERAL GEOGRAPHICAL INFORMATION MAP OF
AZERBAIJAN**

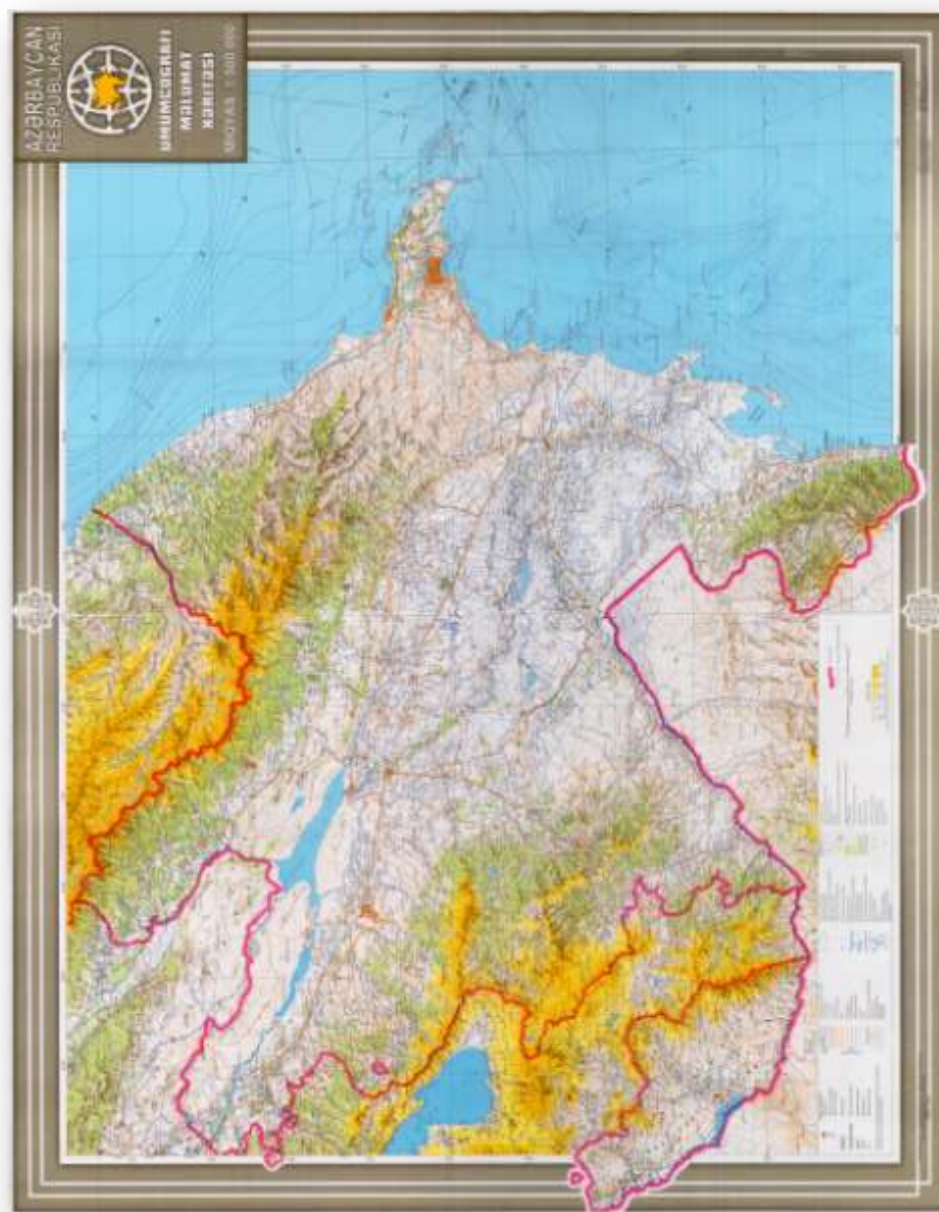


Figure 51: General Geographical Information Map of Azerbaijan

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