Dissertation

URBAN STREETS

Towards Sustainable Mobility in Arabic Cities

vorgelegt von
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SI Städtebau-Institut
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Preface

One of my major motivations for this study dates back to the summer of 2005, when I had the chance to look more closely (or with more critical eyes as a freshly graduated architect) at the situation of urban life in Jordan, where obviously the majority of ongoing developments were more engineering–based, constant building of bridges and tunnels, whereas none or little was being done for the people and the "sense of place".

It is argued that the level of freedom a person experiences while walking around the city streets, is proof of how civilized the place is, a good urban place is one that offers the people the chance to move about the city in a free, safe and pleasant way, and whose space assists in orienting the user in finding his way from one place to another without fear or confusion. The lack of all these elements has mostly been noticed in the downtown district of Amman, where streets have mainly been designated for cars, not for people, although downtown Amman is the oldest part of the city, and it comprises the main "Souk" (the oldest business district), with a lot of different services and small businesses, most locals try to avoid it, and limit their visits to that zone only in emergency or highly important cases. Locals also treat that district as one for the poor.

Streets should be designed for "breathing". In contemporary Arabic cities we see a tendency now of building huge enclosed air-conditioned malls, which are becoming the primary places for socializing and spending free time. Streets in Arabic countries should regain their historical importance and social character, streets should allow for "experiencing the city" and help in child development, as it is the case in many European cities, where streets are designated for people, where individuals feel themselves part of the city, and the city part of them, where streets provide the backdrop for everyday life, not only for "drivers" through the windshields of their vehicles, or for tourists, but, above all, for locals and pedestrians.

This study argues that although a lot of applied Western solutions for Arabic urban problems have turned out to be harmful, especially for the traditional urban fabrics of Arabic cities, it is still possible to borrow some Western urban concepts for many of the street problems facing these cities today. Although many differences exist between Western and Arabic cities, the needs of people, in terms of safety and freedom, do not differ around the globe.

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SUMMARY OF THE RESEARCH DESIGN

Foreword

Throughout history the study of the street has been extensive in Anglo-Saxon and European countries, a lot of literature exists on the subject and a lot of practical guidelines and solutions have been found and applied in many European and American cities with different levels of success.

It is easy to point out several "great" or considerably well-designed European streets and praise them, like *les Champs- Elysées* in Paris, *Via del Corso* in Barcelona, or the *Boulevard Saint-Michel* in Paris, whereas no name of a significantly designed Arab street comes to mind. It is ironic that we can find a lot of appreciation in Western literature for the organization of Arabic cities, while on the other hand contemporary Arabic cities are facing the most severe street problems today, and up till now, the study and analysis of their streets have not been extensive enough.

Defining the Problem

The Islamic city differs from cities founded and developed in the European sphere of cultures in regards to:

  - the physical form and culture
  - the social and economic structures and organization

Consequently, the streets also differ, and due to the socio-economic changes and political factors taking place in those regions at exceptional speeds, many problems regarding streets are coming to the surface and need to be dealt with by urban planners today: Studies show that among the biggest and yet most common problems that many Arabic countries are facing today is traffic management and the problems associated with it like pollution, noise, lack of pedestrian routes, urban poverty, etc. The main causes of increased traffic congestion are overpopulation (due to political as well as social reasons), insufficient public transportation infrastructures that have led to the full dependence on private vehicles, as well as the land-use policies in Arabic cities. Other severe problems include lack of green/open spaces in cities that impact children adversely, who are forced to use the streets as their only playgrounds, and that in turn constantly leads to accidents and deaths of youth in the streets. Treating the streets as "a place for people" has been abandoned. Traditional urban form in the older parts of cities has undergone radical transformation in which a great part of its coherent and relatively homogeneous traditional fabric, or "consistent urban collage" has either been fragmented or remodelled, using modernized urban models, or it has entirely disappeared. Uncontrolled urban growth has led to urban sprawl and the emergence of modern city suburbs that are totally dependent on the automobile, aggravating the situation especially for the low-income populations.

Formulation of the Research Hypothesis:
It is evident that urban streets in the Arab world, whether traditional or more modern, are facing a lot of problems. This study will argue that a traditionally sensitive and responsible urban street design is needed, and that past experiences in borrowing foreign solutions for the urban problems of Arab Muslim countries have been invariably unsuccessful because they were aimed at mere copying, transforming and expanding instead of preserving and developing existing qualities or using available opportunities.

But since the sixties and seventies, a new approach in Europe has made an attempt to resurrect streets, this approach has been embraced in Europe wholeheartedly especially that it has argued for a segregation of vehicles and pedestrians at ground level, not the vertical separation [Kostof 1992]. The paper will try to study if this new European approach can provide Arabic cities with solutions to their problems, it will further argue that (as past experiences have shown) foreign solutions cannot be treated as ready-made and be taken in their entirety from one place and applied to another, solutions to urban problems should undergo transformations that will make them adaptable to each individual place and environment. Western tools and methods should be considered but a selective process of adaptation and gradual integration, which takes into account existing local characteristics and values, should be followed.

Research questions
The research attempts to answer the following questions:
- How is it possible to contribute to sustainable urban development through street design and traffic-calming in Arabic cities?
- What constitutes the essence of street space and public realm in Arabic cities, what street patterns and uses are favored in view of the urban culture?
- Could it be possible for the streets in their traditional form and functions to perform the desired tasks and requirements (that they have been expected to perform in the past) in relation to the present social and economic changes in these countries?
- Could other urban concepts (foreign ones) contribute to the solving of contemporary problems in traditional and modern neighborhoods of contemporary Arabic cities, and which transformations should these solutions undergo before being transmitted and implemented in the different physical and cultural context?
- What concepts and traffic-calming measures are best suited for the context of Arabic cities
- What determines why some overlays have positive results for some places, while in other cases, imported Western gridirons are disruptive and threatening to the traditional urban fabrics over which they have been overlaid?
In the Eastern literature until today, these vital questions have hardly ever been answered, and it is sad to remark that the ideas of sustainable urban street design and traffic calming have been

absent among Middle Eastern practitioners.

Objectives
The main objective of this research is to identify approaches to win the streets back for the people, reduce transportation impacts, create civilized streets that respond to worldly design standards of safety, comfort and design sustainability, but above all, such, that are compatible with the unique urban structure and culture of Arabic cities.

The research also aims at examining international solutions mostly developed in Europe for comparable urban street problems, to see whether they could provide us with answers to the problems in Arabic cities, if so, can they be directly applied or must they be adapted. Furthermore, if the solutions to the contemporary street problems of Arabic cities lie in adapting and developing experimental alternatives to the current Western planning approaches, the overall objective will be to find out how those alternatives should be developed. What needs to be considered so that imported solutions are well-adapted in an Arabic urban environment without affecting its identity? Finally the research attempts to elaborate on the various components of successful as well as environmentally responsive urban street design.

Research Methodology and Brief Summary of the Chapters
Chapter I
In chapter I, a historic and a morphological approach is opted for to study the urban development process of streets in Arabic cities, with special emphasis on the traditional Muslim city, its structure and the typology of its streets. This has also demanded knowledge of types, social patterns and of the ways those spaces were created and utilized by the people, this will help in:
- distilling (pinpointing) the substructures and substantial characteristics lying at the heart of urban culture and street space of Arabic Muslim cities together with their functional bases and what affected their morphologies,
- identification of the cultural characteristics of the group or groups in question, their unwritten rules about permitted activities and acceptable "settings" in the public domain of the street.
The streets' development will also cover later developmental stages of the colonial and contemporary times to examine the changes that occurred to the street space. For the past experience of Muslim societies serves also as the basis for defining the elements of a cultural continuity which are essential in any search for authenticity and determination of self-identity.

Chapter II
In chapter II, a literature review and analysis of state-of-the-art international approaches and solutions is conducted that aim at a sustainable street design and traffic management that are being applied worldwide to solve urban streets problems, similar to problems that are being experienced in Arabic cities.

Chapter III & IV

Subsequently, empirical research is conducted in chapters III and IV, based on two extensive case studies that analyze the contemporary real life situation of urban streets in two Arabic cities, Amman and Aleppo. Emphasis was put on studying urban street problems in a traditional historic center as well as in a modern district of a non-traditional Arabic city. The urban analysis is conducted on three levels: the city, the quarter (neighborhood) and street levels.

The case studies will not only point out typical street and traffic related problems, but critically dissect today's practices and approaches of the planning authorities in Arabic cities by examining the outcomes but also by gaining access to previous and current traffic development plans

The study is further supported by interviews with people working or living in those neighborhoods as well as specialists that designed or worked on traffic-calming measures.

To ensure reliability and generality of the findings from the two case studies, they were reinforced by additional literature analysis and data synthesis from researches and case studies of comparable MENA cities to make sure the problems pointed out in the case studies are typical problems to most Arabic cities.

Chapters V

Chapter V will begin with a short analysis and summary of the analogies and differences between the European and Arabic contexts, but the bulk of the chapter will present recommendations for the improvement of the streets and traffic-calming in the specific Arabic context based on the analyses conducted in chapters I-IV. At the end, a flow diagram is provided that shows how alternative solutions can be developed, followed by more general urban street design recommendations on the street level.

Chapter I

STREET SPACE IN ARABIC CITIES
Genesis & Development
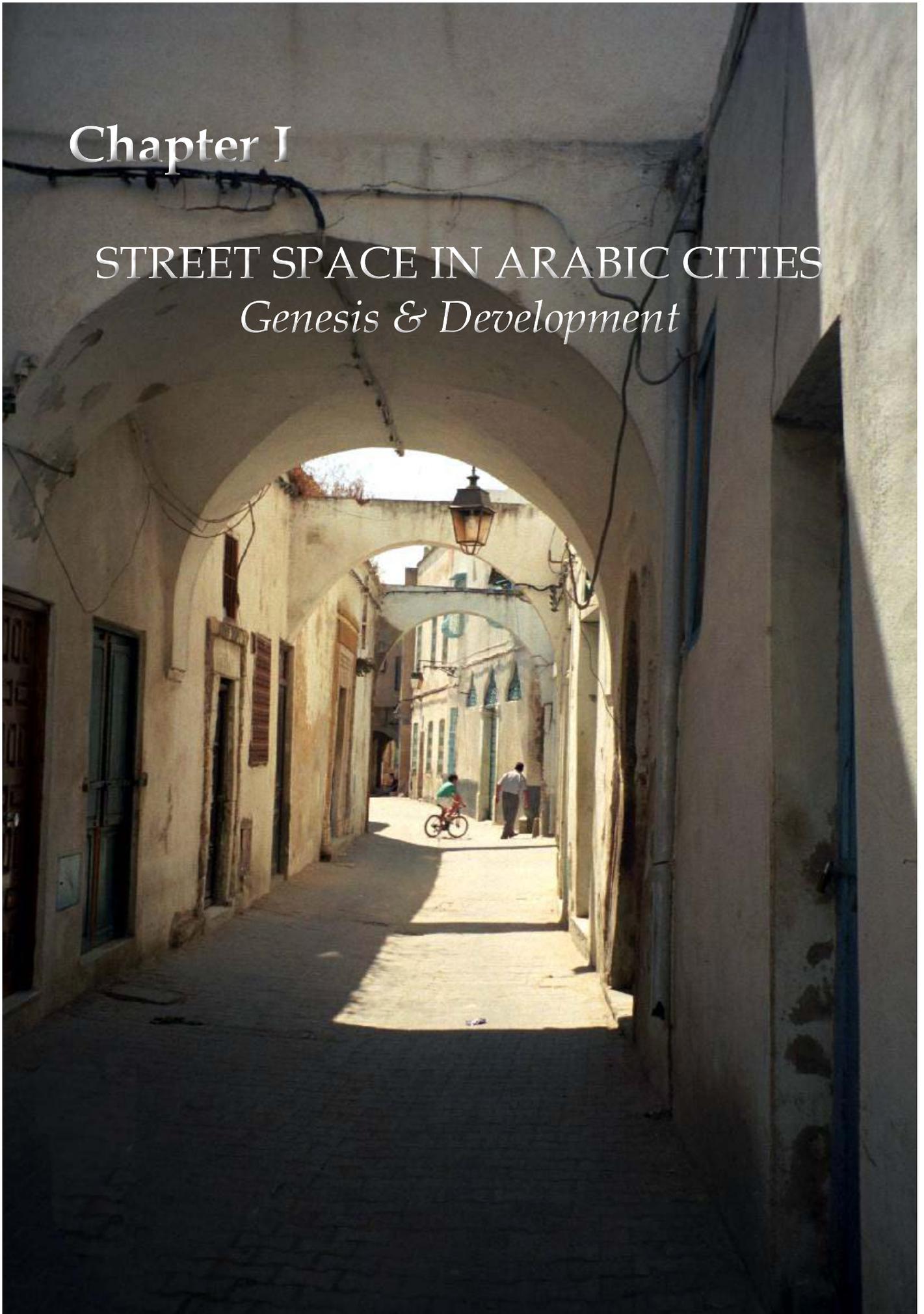
1.0 Introduction

A city isn't only a collection of buildings for various purposes and the center of the production and exchange of goods and services, which can simply be made to "function" better, by means of universally applicable formulas, but rather it is a complex and multidimensional cultural entity within which social organizations, ways of life, skills, beliefs, standards, values and cultural representations find expression. Furthermore, cities can only be understood through an awareness of the many different relationships they have with their natural and human environment as well as with their non-physical environment. [Bouchenaki, Laurent & Strauss 1998]

Today's street planning in the Middle East and North Africa should, on the one hand, address universal challenges that face urban design since the motor age, like safety and efficiency of transport flows etc, treat the street as an urban place and movement channel and find ways to cater for those maybe often contradictory "modern" vs. "traditional" new needs and expectations of the Arabic Muslim society in times of globalization. On the other hand, planning should address the other major challenge, which is managing to keep continuity with the rich past and heritage, in order to preserve the unique identity and the invaluable traditional urban heritage of Muslim cities, especially in this day and age when the importance of maintaining and recreating it has been nationally and internationally recognized.

The urban fabric, in traditional as well as recent districts, is continuously changing. In Cairo, for instance, where the renewal process of whole districts is taking place at a constant rate and the major focus of the preservation of ancient fabric consists of buildings that are less than a century old, what cannot be overlooked is the critical role of the permanence of alignments and plot configurations which ultimately preserve the memory of a town.

So it is evident that if one wants to preserve the historic character of a place, it is not enough to simply refrain from demolishing its buildings and quarters or preserving single monuments, but it requires examining the whole urban fabric, and its rich history. We may, as well, have to attempt to re-create the conditions and quality of life (rich urban form and environmental quality, social interaction, residential privacy, pedestrian safety etc) that existed in those traditional quarters in our new city quarters in order to allow people a more immediate contact with the memory and beauty of that place.

For the study of the "urban process" embodies the intricate interaction of social, economic, political, technical, cultural, and artistic forces that bring about the form and give dynamism to the city through time. Lefebvre proposes that to avoid the "trap of treating space as space in itself" (not an uncommon trend among architectural historians and critics), the urban historian must look at the "production of space and the social relations inherent to it" and uncover those social relationships. This involves

not chronologically fixed urban forms, but the "long history of space"[Çelik 1997]

Abu-Lughod (cited in Bianca 2000, p.185) has written that: "The reason why we are interested in traditional forms of building, dwellings, and settlements is that we believe that such achievements met human needs in a more sensitive way than contemporary and\or alien methods do. It is this belief that sends us back to the past, and that sends us to the local and the specific".

Indeed, pedestrian scale and sense of community, two key elements of New Urbanism, were ideally evolved in traditional *medinas*.

In this chapter we will trace the development process of streets in history and study their typologies. Some of the questions to bear in mind are: what were so unique about the traditional street environments? How were they used by the people of the city and what socio-economic functions did they fulfill? What are their unique physical and spatial elements and how have the streets been managed? What changes occurred in colonial and in modern times? In addition to these questions, matters such as patterns of responsibility, public awareness and control will also be investigated.

Streets of the following eras of cities in MENA will be traced:

-        The traditional cities (early Islamic to medieval)
-        The colonial cities
-        The contemporary cities

1.1 THE FORMATION OF TRADITIONAL ARABIC MUSLIM CITIES:

1.1.1 Transition from the Classical to the Early Muslim City

It has been acknowledged that the most complex and far reaching changes in urban design between Greek & Roman and the emerging Muslim cities in late antiquity and the early Islamic period was the altered street layout, from the large central avenues crossing at right angles from Hellenistic times in cities of Syria, to the irregular narrow winding pattern.

Fig. 1- 1 The transformation of a colonnaded street in the early Islamic era, as merchants started erecting their booths along the main pedestrian flows, first as temporary, then as permanent structures
(source: Bianca 2000, p.127, original drawing by Sauvaget)
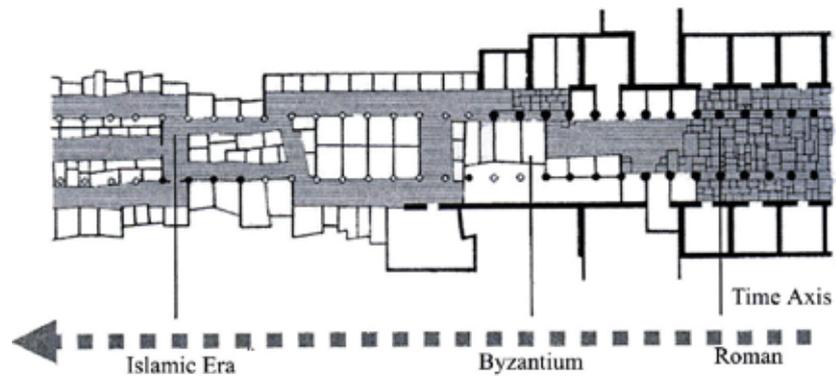
Major Influences for Change:
The initial factors that influenced the pattern of streets in Muslim cities can be summarized as follows:

- Change in use (and the needs of the people):
  Trade started to occupy an important place in Muslim societies and was highly regarded. Wide classical streets were no longer found useful for the Muslim conquerors that encroached upon and built over them.

- Change in modes of transport and movement:
  from wheeled carts to pack animals (mules, camels and donkeys) and to a mainly pedestrian circulation

The belief that the advent of Muslim rule tended quickly to corrupt orthogonal patterns was already challenged by the end of 1950s, but most forcibly since 1970 in Hugh Kennedy's article "from Polis to Medina" where he states that archaeological excavations prove that transformation of orthogonal streets of the Greco-Roman city in Syria goes back to the fifth and sixth centuries— that is long preceding the arrival of the Arabs, who appeared in the 7th century, the same was confirmed by Petruccioli (2007), but he referred to much later excavations that dated these changes even to the third or fourth centuries. Likewise it was disproved that the transformation of streets was necessarily connected to a period of anarchy or lack of governance. Interestingly, recent evidence from Scythopolis (the Arab town of Bisan) shows

that a straight and broad street of the city center with colonnaded porticoes wasn't, as could be expected, a mere well-preserved street from the Byzantine period; an inscription proves that the street (stylistically faithful to Byzantine urban planning) was indeed built by the local Muslim governor on orders of the Caliph in 730 [Kennedy 2008].

Now the questions that have engaged researchers and the points, over which there has often been disagreement or ambiguity, are whether behind this irregularity and organic form some order nevertheless exists (a designed intention or deliberate preference), or whether these settlements were anarchic. Is the latter the reason why those streets have become so crooked? And were the streets in Muslim cities merely left-over space?

1.1.2 Debate on Major Influences Affecting the Formation of Traditional Arabic Cities

Some like Kennedy (1985) argued that the Muslim early society did not deliberately choose to develop towns with winding streets out of any conscious aesthetic or cultural preference and he disagrees with the idea that there is something in the spirit of Islam which leads to the enclosed, private and secret world of the Muslim city, such assumptions he concluded, shouldn't be entertained by serious urban historians. He claimed that the earliest planned Muslim towns like Anjar and Samarra (and he also suspected the same of Kufa) were laid by Muslim rulers and adopted orthogonal plans, he believed that where cities were planned, the early Muslim surveyors (al-muhandisun) had very similar ideas to those of their predecessors. He believed that Muslim society were free to build over their houses and their public streets, that the house in Muslim cities was held to have some rights over the adjoining public space. Here he refers intuitively to the concept of the *fina'* (which will be dealt with in more depth later): since there were no legal restrictions, he concluded, people were tempted to enlarge their properties at the expense of the public street, extending their houses into the street without needing to seek permission from anyone and in the case someone didn't like it, he would take the matter to the *qadi* (the judge) to complain. Kennedy underlined that it was through mainly private prosecutions that any building related activity could have been halted or reversed but not through the authorities themselves, believing that legal changes had only little influence on urban development.

Another group of scholars attempted in turn to show that there were indeed connections between the *Sharia* (Muslim law) and urban development by studying the court records comprising judicial decisions made by judges in various medieval and pre-modern Muslim cities. For instance, Brunschvig studied the legal texts of two Tunisian *Qadis* (judges) namely Ibn al Imam and Ibn al Rami concerning public and private roads from which he concluded that Muslim law made a clear and strict distinction between public and private streets, and that public streets had,

in fact, certain restrictions and regulations on obstructions, street width and projections (overhangs) that usually did not apply to private dead-end roads in residential areas [Brunschvig cited in Goddard 1999]. In reaction to this, Petruccioli highlighted the fact that even if law had influence, it adapted to the idea of already established space and not vice versa [Petruccioli 2007].

Initially, Muslim towns varied in their formation as they were either spontaneous decentralized developments like Kerbala or Mashhad or very organized formations planned by a central authority. These "created" towns varied from princely towns founded by a ruler intending to move his residence to a new location near an old capital, to fortress towns, like Rabat in Morocco, politically inspired towns and capitals like Baghdad and Fez or finally military garrison towns such as Kufa in Iraq and Fustat in Eqypt [Akbar 1989]. Nooraddin (1996) believes that streets in Muslim cities always developed and transformed organically, regardless of what form cities previously had: whether they were built from scratch like al-Fustat or Baghdad by the army with initially planned wide straight streets, or cities that took over and transformed already existing pre-Islamic settlements like Aleppo and Damascus; with time, he underlined, they always managed to gradually acquire more and more organic characteristics and form. This meant that although initially different, they all acquired similar characteristics with time, which led scholars to assume that the towns followed the same set of specific principles which eventually made them resemble each other. Hence, the study of valuable sources of Islamic Jurisprudence led some researchers to form an understanding as to how traditional Muslim cities formed. Regardless of the different beginnings of towns, it is generally accepted that the two main factors really contributing to their irregular patterns, were the revivification of dead land and *al- fina'/harim* concepts which had a major influence on the many small decisions made by the settlers and residents themselves leading to deformations, which eventually brought about the morphology of these towns.

The Concept of Revivification and *al-Harim*

The concept of "revivification" that was used during the early Islamic period meant that all unowned land (peri-urban or urban) that had no owner or was not used by anyone for any purpose or had been deserted, was called *mawat*, meaning it was dead land and individuals, who wanted to revive this land by building on it or by cultivating it, could later assume its ownership. Some scholars believed that the ruler's approval was needed while others believed approval by the authorities was not needed in every case. To revive a land a person could mark the land and soon after build on it *(Ikhtitat)*, if immediate building didn't follow the marking it was called *Ihtijar*, a person was allowed three years to decide what to do with the site he marked out for himself. A third option was called *Iqtaa'*, this meant that a ruler bestowed allotments on individuals or clans and it is this central authority

who decided on the boundaries of endowed plots [Akbar 1989]. Also one *khatta* could include many smaller *khattas* inside it after subdividing it between different families of a clan for instance.

Consequently, one would expect that as parties were free to revive any empty land, even in urbanized areas, everything would be compactly built-up with no left-over space for access and circulation. What complemented the revivification was *al- harim*, a sort of a buffer zone, reserved land or an area that was sacred, accordingly a city can have its harim, for instance a city's outer ring could be considered its Harim, a house has its own *harim* (exemplified by its inner-courtyard) but it also projected outward on what is considered a public space in the defense of its own uniqueness and intimacy. This meant that opening a door directly opposite that of another neighbor was forbidden. Use or revivification of *al-harim* was prohibited to others, any revived piece of land has its own *harim* which was what the land wouldn't be able to function without, like an access way. Meaning no one had the right to interfere in someone else's *harim*.

The Concept of *al-Fina'*
Al-fina' is the outdoor space on the street abutting a property and is owned and used exclusively by the abutting party (residents, occupiers). It is considered the outdoor *harim* of a house and is applied at ground level and in the air. Some jurists determined its width by the spot where the water spout pours on the ground; whereas others (like Ibn al-Rami) stated that its width should be 4-6 hand spans (90cm-130cm) depending on the width of the street. A party could manipulate and use its *fina'* for different activities like trading, storing possessions, herding cattle, sitting and staying etc., as long as the using party adheres to the Prophet's advice and does not harm passers-by (doesn't gaze at them nor flirts or harasses women). Most rites treated the residents/occupiers abutting the *fina'* as the legal owners of that space, and as the legal controllers of it, they could lease it to others. In contrast, others considered it the ownership of all Muslims in the same way as a street is, but one was clear, the *fina'* space couldn't be sold in separation from the building abutting it and is not subject to revivification. The owner could demarcate it if he didn't wish passers-by to use his *fina'* steadily. Opinions also varied on whether the owner could build on the space of his *fina'* by extending his building towards the outside, most agreed that this right is dependent on the width of the street in question, generally it was allowed if no damage was caused and if the street in question was inactive, whereas it was forbidden on wider and busier streets, (seven cubits was considered wide), except for one jurist, abu Hanifah, who was against any construction on any street [Akbar 1988].
But it is exactly the act of expanding and building that mostly influenced the morphology of the streets. On residential streets erecting simple structures like benches or sheds or planting a tree in the *fina'* wasn't objected to by jurists as long as none of the

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Fig. 1- 2 The *fina'* and how it is utilized along the streets and access paths, also vertically alongside the building walls
(source: with permission from Professor Besim S. Hakim, page 28 of his book: Arabic-Islamic Cities - Building and Planning Principles, 1979,1986, paperback edition 2008.
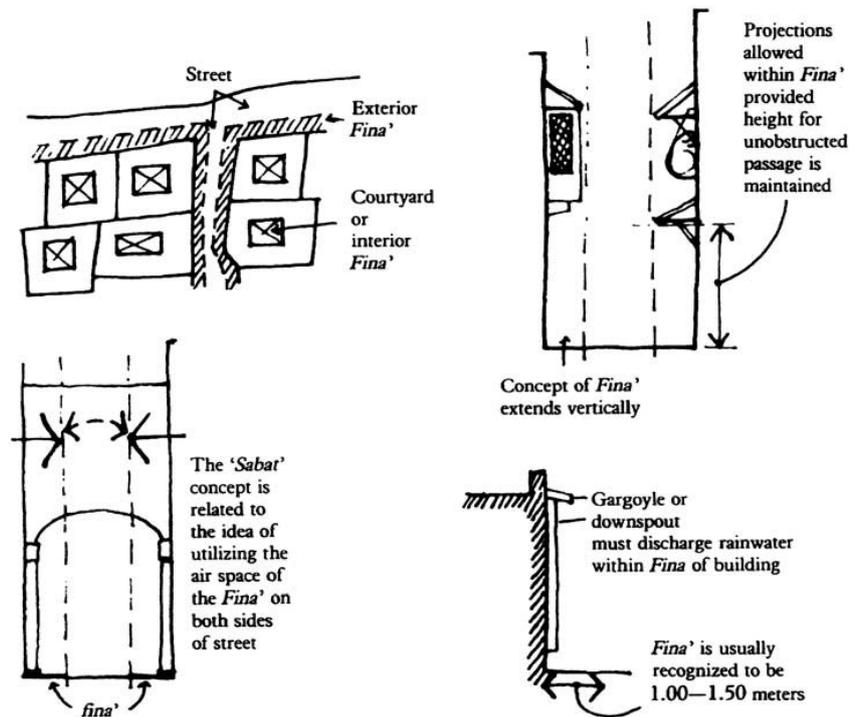
neighbors complained

In an attempt to reconstruct the formation of a Muslim city, several scholars like Nooraddin (1996) said that in the early period of forming cities like al-Fustat each clan had its own quarter, its size dependent on the number of its members and its power. The quarters were separated by buffer lands (*al-harim*) or open spaces. This could have been for military purposes, such as to facilitate the movement of the troops. The street network inside each quarter was established as a result of the aggregation of dwellings which had irregular plots dependent on the family's wealth or position. There were also unpaved roads to connect all the different quarters with each other. Later when the military situation became peaceful for the Muslims, members of the clans allowed their relatives from Arabia to build on its protected land (*al-harim*) which surrounded their quarter. As a result each quarter expanded into the other quarters, and by this process the quarters became denser and clustered. In Nooraddin's opinion, a major factor contributing to the organic form is the concept of the *fina'*, occupation of the outdoor space by residents or their structures and the different "settings" that developed. By "settings" he referred to the activities and physical adaptations pursued by the people in the space of their *fina'*, and this he believed was stimulated by or created for social, economic, climatic, religious, lifestyle-related or traditional reasons. Sometimes these modifications and uses could be in disharmony with Muslim laws, and although some jurists had been opposed to certain transformations, like occupying the spaces of the street around the mosque for religious purposes, still, this couldn't stop the process. He summarized this transformation whose two major players are *al-fina'* and *al-harim* as follows:

1. A settlement is established either as a spontaneous or a planned settlement. In the early stages of building a city, the *harim* (reserved land) was enforced, surrounding the built up area of the city.
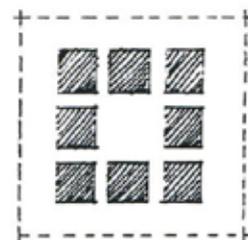
2. Most of the jurists required the local authority's permission to occupy a *mawat* (dead land) closer to the city (within the built-up area), it is logical that consequently most of the people ,especially in cities where this rule applied, would have chosen locations far from the edge of the city to avoid the restrictions of the authority and conflicts with the owners. Then the standard distance between the built up area and the new cultivated land could be applied.
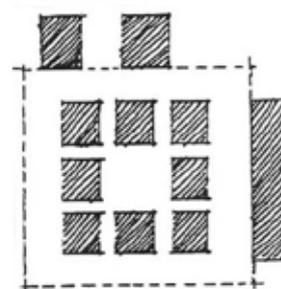
3. When most of the lands surrounding the city were cultivated and the population of the city increased, then the people would build the rest of the unoccupied lands in the city until all the available lands were built up.
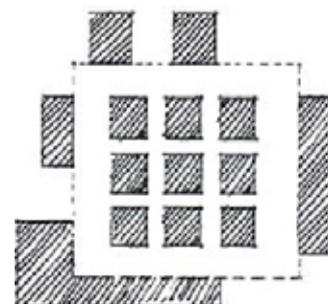
4. Then some people would occupy the *fina'* and modify its territory which contributed to reshaping the street. Others would subdivide or combine the properties to house more people and activities. This might require establishing new roads or the closure of existing ones.
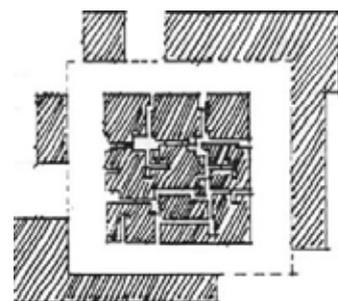
5. When the inner city became denser and most empty pieces of land were built up, people would then occupy the *harim* of the city by permission from owners or the local authority. They were obliged to leave enough space for the street. If they disagreed, then the width had to be 5-7 cubits for the street but this standard could be changed if the users agreed on another dimension
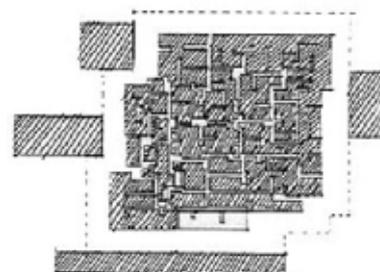
Fig. 1- 3 - 1- 7 The formation of a Muslim city as interpreted by Nooradin based on *al-fina'* and *al-harim* concepts
(source: Nooradin, H 1996, pp. 207-208)

6. Once all the harim area and the cultivated land around the city had been built up, a new harim of the city would be formed. Then, the process would start again.

So the organic evolution occurred as a result of the increasing expansion of the town activities and its buildings once it gained in importance by becoming a center for political and economic activities as follows:-
- Building the vacant lands within the built up area of the city.
- Subdividing or connecting the plots of the houses.
- Occupying *al-fina'* of the streets.
- Building over the existing built up area

He observed two important characteristics or tendencies in the traditional form of occupancy of *al-fina'*:
- Separating private indoor space of the dwellings from public outdoor space to protect the private life of the Muslim families. At the same time creating the possibility for people to watch the street life and events from their home.

- Connecting the indoor space of the shops and often commercial and public buildings with the public space of the street to explore different meanings, stimulate economic activities, meet climatic demands and support community life in the streets.

Nooraddin wasn't the first or the only one to study the concept of the *fina'*, but his work is the most extensive on the subject and deserves much attention in order to build upon it.

Morphologists like Caniggia, Petruccioli and Berardi acknowledge the presence of a spatial order eminently structured in an urban framework often defined by others as disordered, spontaneous or arbitrary. Conceptually, it was composed of nested hierarchies of space, based on the primary unit of the inward-looking courtyard house. Traditionally, the nested hierarchies were created through a process of agglomeration [Bianca 2000]. Petruccioli (1999) (2007) argues that although the urban tissues developed spontaneously, they are rather regular, but not as a result of authoritarian planning strategy but of general rationality between proprietors having equal property rights, he believes that as history unfolds, the urban organism always responds to the principle of maximum result and therefore to a formative logic, it doesn't trust chance but follows typical principles of adherence to the morphology of the place and the cultural instances of society. The crystalline form of an original city doesn't persist as residents quickly see to the deformation of its design with individual acts of appropriation, as soon as there are fewer guidelines for its design.

1.1.3 The Spatial Organization of Traditional Arabic Muslim Cities

A basic feature of Arab Muslim cities is a strong centrality in urban organization and a marked separation between a multi-functional public urban core, and the private zones of residence. The city center encompasses different layers of interconnected souks (permeable space open to the "other", usually organized around a covered market and the principal mosque, which could have at the same time been a university, sometimes of international standing, supported and interspersed with different public buildings namely *madrasas* (theological-juridical schools), *hammams* and *khans* (hotels). It was usually marked out by a central thoroughfare like al-Qasaba in Cairo, Straight Street in Damascus and nodal functions that wouldn't interfere with the holiness of this central area. Accordingly, commercial activities and guilds spread concentrically in nuanced hierarchies from the center to the periphery, whereupon all the prestigious businesses and products were located around the Friday Mosque while least important crafts, disturbing and unhygienic services as well as activities that required lots of space and contact with the hinterland (ease of transport) were pushed outwards to the periphery. So, for example, we could find souk *al-Sagha* (the Goldsmiths), the money changers, the scent market (souk al *At-*

Fig. 1- 8 The transformation of the planned street layout of Aleppo during Greek (a), Byzantine (b), early Islamic (c) & late Islamic (d) times
(source: Nooradin, H 1996, p. 57, original by Sauvaget)
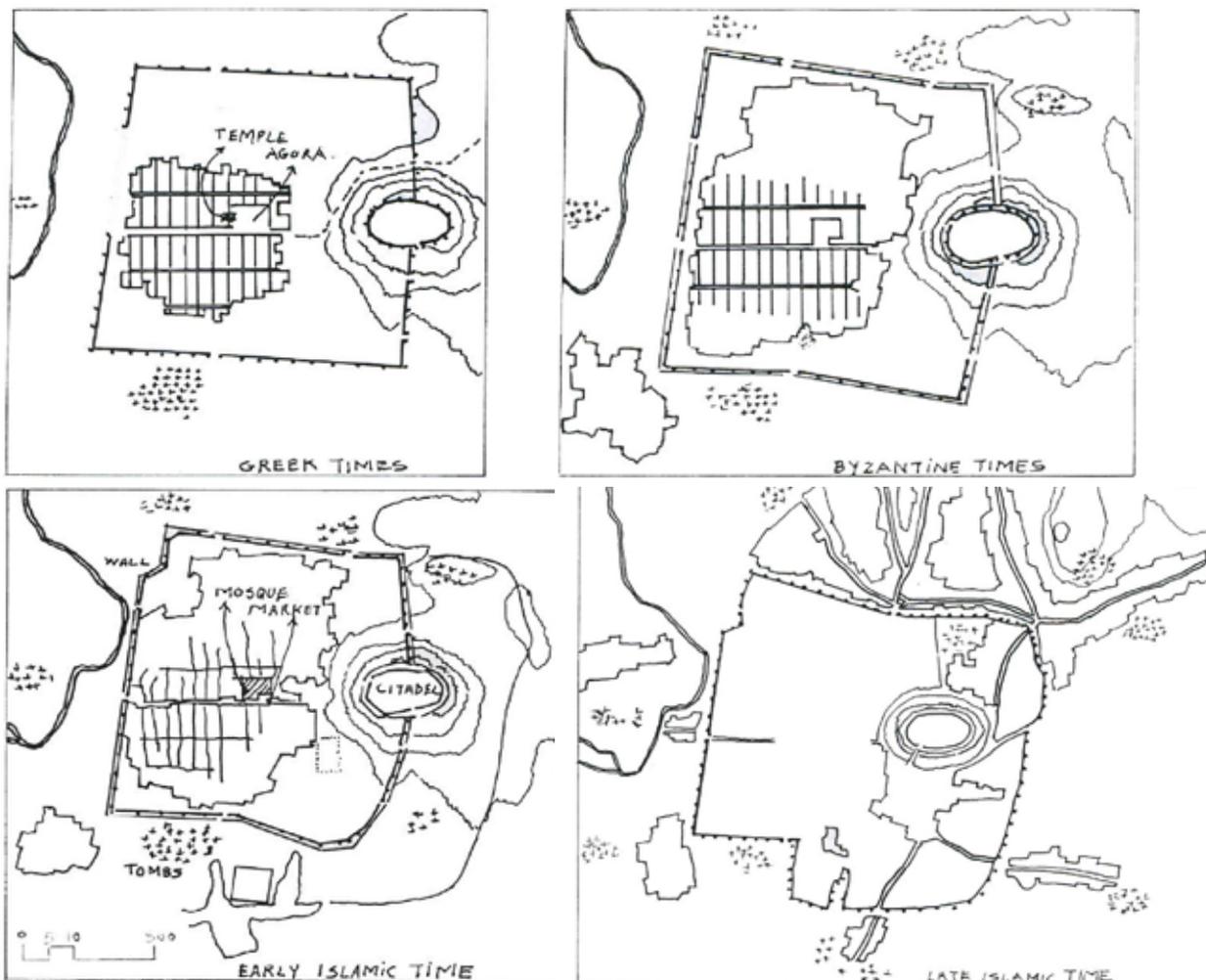
tarin) and bookshops, etc closer to the Mosque, whereas rope-makers, mat-makers, tanneries, dye works, markets dealing in agricultural produce, parking lots and the slaughterhouse occupied the fringes or were located outside the walls. An exception to this was the copper market (souk *al-nahhasin*) providing essential kitchenware and household goods which despite the noise it produced occupied a central place [Petruccioli 2007] [Raymond 2008]. Sometimes the organization of activities did not occur spontaneously but was effected by urban officials like judges (*qadis*) and *hisbeh* officials who removed or transferred certain uses from one place to another. In Arabic Muslim cities it was also usual to find more than one Friday mosque. This central area was well-linked to the city gates by means of relatively broad and regular streets radiating from around the main thoroughfare like al-*Qasaba* in Cairo or Straight Street in Damascus, or from around a number of parallel streets like in Aleppo, which allowed good access essential for economic activity.

Beyond this central area stretched the city's private zone, namely the residential quarters intra-muros (sing.: *hara* or *mahalla*), which grew in the space left between the edges of the multifunctional core complex, and the main pedestrian spines crossing the city, everything being contained by the outer city walls. Housing units closest to the central core housed the oldest dwellings and most notable families. In their gradual growth process, housing clusters would often grow over agricultural space (open space) towards the city wall, absorbing agricultural pathways and irrigation systems, which once internalized became subservient to the residential units. In later periods on the other hand, it was the commercial core that expanded at the expense of the surrounding residential zone to replace houses by souks and caravanserais.

Housing districts were composed of several housing clusters, clusters were in turn composed of enclosed units around a central courtyard, wrapping around internal dead-end alleyways. The courtyard house became the favored typology of most Arab-Muslim cities, its enclosed and introverted private space perfectly served the requirements of the Islamic social order centered on the holiness of family life but equally optimal for the climate. In many Muslim cities there were several types of houses: those aligning a route and which opened to the street by means of a dog leg atrium to prevent a direct view from the street to the heart of the house, houses with an entrance on the public route but which were set back behind a *driba* and look inwardly to the cluster of houses where the *driba* opens to the dog-legged atrium in turn opening into the courtyard. The third type includes the houses that are adjacent to or at the end of a blind alley.

Bianca (2000) describes how the physical coherence of this urban system is an outcome of graded articulation of a series of polarities, between included and excluded, between "inside"

and "outside" or "public" and "private". So the courtyard was outside in relation to the rooms of the house around it, while it was inside in relation to the house itself, the same holds true for the residential alley which is "outside" the house but "inside" in relation to the quarter. It is as if these polarities are tamed by integrating them into a larger unit on the next hierarchic plane. Residential quarters housed around 200 families (1000 inhabitants), had a familial environment and were the scene of active collective life with familial celebrations (circumcisions), collective festivities (a ceremony based around a local saint), rejoicings and processions [Raymond 2008].

The private dwellings' dependence on the center for shopping was relative, for they were also equipped by own commercial nodes in the form of a *suwayqa* — a minor unspecialized market catering to the most pressing daily needs (especially foodstuffs), so one would always find a bakery and a grocer, but there also were a *Masjid* (mosque or prayer hall for daily prayers), drinking fountains (*sabeels*), flour mill, a Quranic school, often also a *hammam* or several smaller *hammams*. So, even if a quarter lacked some services, it could depend on the neighboring quarter for satisfying pressing needs by using its services. In larger cities, where distances between the farthest residential quarters and the core were too far, secondary trade and craft agglomerations, at a smaller scale, developed close to the outer gates which were frequented by the residents instead. Consequently, mobility inside the *medina* was not mono-functional (from the periphery to the center) but multi-directional instead [Petruccioli 2007].
In contrast, political and administrative-related buildings varied in their locations, while most important courts and some administrative services were located in the "center", the higher authorities though, were to be almost always sited at the city's fringe or right outside the walls, probably as protection in the case of popular uprisings or out of convenience (e.g. large available space to house the troops) [Raymond 2008].

1.1.4 The Public Realm & its Major Characteristics
The public space system, based mainly on pedestrian movement, was composed of the narrow passageways of the souks and commercial streets that were balanced out by the large central courtyard of the Friday Mosque — the main public open space — and the courtyards of the ancillary buildings, such as *madrasas* and caravanserais, providing compensatory public space off the covered main alleyways for specialized functions and social needs [Bianca 2000]. Residential streets also functioned as a semi-public space, but mainly for the residents of these quarters including even women and children who used the blind alleys as an extension of their houses that opened onto them. Interestingly, the rooftops of the *casbah* in Algiers functioned as an alternative public realm that extended over the entire city as the dense configuration of the *casbah* made it possible to pass from one terrace to the other and visit other homes without having to use the streets.

This led to the appropriation of this space by the women of Algiers, who used these opened spaces as complementary to the interiorized courtyard, enjoying the views towards the city and the sea (see fig. 1- 9), so there developed a kind of vertical separation into two urban realms based on gender, on the top were the women, occupying the expanse of the entire city whereas at the bottom, the streets belonged to men [Çelik 1997].

Major Characteristics of the Public Realm:
Enclosure
Enclosure has been called "the fundamental concept of architecture in the Islamic world" as it relied on the contiguous courtyard tissue; a very significant percentage of a historic *medina*'s structure is defined by the enclosure's walls. Streets were well-defined and delineated by them and the compact layout reduced land waste and provided the alleyways and squares with coolness and an agreeable micro-climate. Belcacem [cited in Good 2003] has emphasized the importance of the enclosure of space in Islamic civilization as symbolic of the relationship between body and soul. Similar to private homes, public space was also enclosed if possible – covered markets, caravanserais, *madrasas*, and mosque courtyards – this enclosure and repetition of forms have contributed to a sense of unity.

Pedestrian Dimension and Human Scale
These are the highlights of the traditional Muslim environment which was built completely around pedestrian movement. This memory consists of visual, olfactory, acoustical, and tactile connections.

Hierarchy
Hierarchy was reflected in the road sections which were in proportion to the flux of users and hence became progressively smaller down to 90cm even 50cm in the alleys that lead to individual houses. Hierarchy in the Muslim urban space is also reflected in the infinite gradations of light (amount of light pouring into the different streets), which is proportional to their section and importance and also guides the visitor, passing from well-lit wider main streets through the streets of the bazaar lit from above and finally to almost dark alleyways leading to the houses [Petruccioli 2007].

1.2 THE DEVELOPMENT PROCESS OF STREETS IN ARAB MUSLIM CITIES

1.2.1 Streets of the Medieval and Traditional Cities
First accounts of the irregularity of streets in Muslim cities are taken from the reports of European travelers and scholars who described and judged them in different ways:
One such traveler was Simon Simeonis [cited in Raymond 2000] who described the streets of medieval Cairo in 1322 as "narrow, tortuous, dark and rich in recesses, unpaved, full of dust and

other refuse", interestingly streets in Europe were not much different at the time.

Thevenot described the street conditions in the 17th century as follows: "*There is no handsome street in Cairo, but a great many little ones that are roundabout; it has been well known that all the houses of Cairo have been built without any plan for the town; each one takes all the space that he wants to build, without considering whether he blocks the street or not.*"

Whereas others delighted in those streets, like St. John who said: "*...when after a long ride in the suburbs or surrounding country I have returned to Cairo about the middle of the day nothing used to appear to me more delightful than to plunge out of the scorching sunshine into the cool and dusky passages, where a brisk current of air is generally felt*"

In fact the street system demonstrated a clear functional hierarchy made basically of three different types of routes revealing a carefully articulated logic "a system of filtered access" [Çelik 1997]. Also the system was fundamental since it indicated to the passer-by what was private and what was public: building functions were reflected in the nature of the streets adjacent to them, this has no parallel in European towns. In the Islamic city, the street was subordinated to the buildings it served, if these were private houses then so was the street, whilst in the Western city the opposite could apply and streets were more commonly fitted to street patterns or even functions.

In the following, the different typologies of streets are going to be tracked and their characteristics will be studied, but before this the origin of the crookedness of streets will be discussed:

1.2.1.1 Traditional Streets: mere left-over space?

Not all streets were merely left-over space; research from Kufa (Iraq) shows that there the streets (originally being the distances of respect between different tribes that take possession of land), were laid down by the inhabitants (most probably through consensus between the heads of the different tribes), they radiated from a central forecourt (where the mosque was located) in various directions and that tribes settled in the areas between those streets, whereas secondary streets were formed later either parallel to the main streets or extending between them [Akbar 1989]. The streets were considered shared space. Morphologists explain that first routes of a town that formed before any construction took place (the so-called matrix streets) corresponded with the territorial routes that linked important poles together (hubs of activities or symbolic areas) which often conditioned movement and when the town development began, these streets acquired buildings. According to Petruccioli, in Arabic Muslim cities the matrix route is often associated with the linear souk [Petruccioli 2007]. So these streets cannot be considered left over spaces.

Also when the revived land or property had been inherited (or originally marked by a big tribe) it was subdivided among several parties (of the same tribe or between different inheritors)
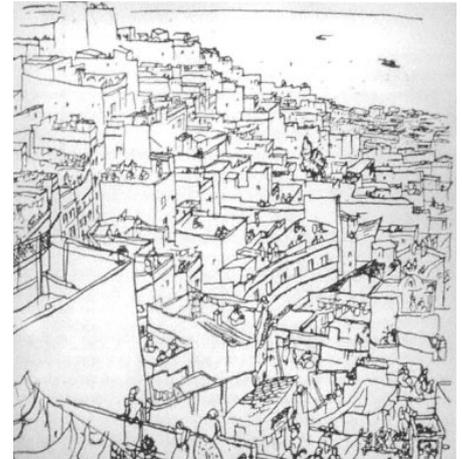
Fig. 1- 9 An alternative public space created by the women on the rooftops of al-*Casbah*, Algiers (source: Çelik, Z 1997, p. 20, sketch by Charles Brouty, 1933)

which also necessitated the creation of new streets, but as some newly revived or subdivided properties in the compactly built environment were contiguously situated behind or within other already existing properties, they had to depend on the first property for passing to reach the public domain, hence the new owner was dependent on the land of the first to access, and accordingly a so-called "system of servitude" was created [Ben-Hamouche 2009] [Akbar 1988]. Here the first party could dictate the rules even if the owner of the property changed, accordingly he could choose to sell the right of passing, rent or simply give easement to the second party for free. Accordingly, pathways were established on a cumulative basis. From this we can infer that the first person who assumes ownership sets the direction of the path, meaning that the newcomer who later revives or gets allocated land next to an existing property or acquires a larger plot on both sides of an already established path has to respect the path set by the first neighbor (by not obstructing it). Akbar (1988) explains that the residing parties that abutted each other decided on the road's position and its width, most often agreements were achieved without dispute. From this we can also conclude that the crookedness of streets in traditional Muslim cities resulted from both spontaneous development, related to the 1st matrix routes linking two different poles that encountered on their way different obstacles, both natural, like rivers, abrupt change in levels etc, or artificial, e.g. presence of defensive walls, which made them assume a curvilinear path. The other contributing factors were the revivification of dead land and the concept of *al-harim*/ *al-fina* that led to many small-scale decisions made by the residing parties as a result of the acts of abutting.

1.2.1.2 Street Typologies, their Physical and Structural layout
There are basically two main types of street— the through, open-ended streets (the public right of way) and the cul-de-sacs, but there are basically three-four hierarchic levels and the principle which usually prevailed was the branching out of a planned route from a matrix route (the centripetal main streets that converged at the center from a city gate), a possible further Y-shaped branching out of a secondary planned route from the main one, and a further subdivision in a layout of a lesser order, but rarely finding connecting routes among these.
Each hierarchical level has its name:
1. Al-Tariq = Shari'
2. Al-Darb (main foundation street leading to a sub nucleus)
3. Cul-de-sac

• The Main Commercial Streets
In contrast to the residential paths the network of public streets was a much more permeable space open to the "public" including foreigners and strangers. As mentioned earlier, these main thoroughfares or arteries, called *Shari'* or *Qasabah*—the first level of streets, were open ended streets that led from different directions from the exterior parts of the city to its heart, normally from

Fig. 1- 10 - 1- 12 First, second and third order of streets: main streets, collectors and cul-de-sacs
(source: ASM n.d., Une Strategie de Sauvegarde Durable - Cas de la Medina de Tunis p. 13)

a city gate into the city's core or from one gate to another, linking important city elements together, hence they were lined with shops, tea and coffee houses and large commercial and public structures. They had a high level of vibrancy and sociability, as they attracted major public activities and were crowded with people and merchandise all day long. Structurally observed, the network of those streets was straight lined, or slightly curved. In addition, main streets usually hosted the most important souks. The street where the Friday mosque stood would have priority and would act as the main axis of the bazaar, linking the most important public buildings together and it would begin at a strategically important point in the city, like for example a city gate, a Friday mosque or the intersection of two important roads, and from there continues in different directions linking other public buildings together. Caravanserais would preferably park on these axes, in order to unload their goods for display without causing any inconvenience for the people of the residential quarters.

Measurements: Street widths were determined by the fact that no wheeled transport was used, transport of goods in commercial streets occurred mainly by pedestrians (porters) and beasts of burden, hence the width of public through-streets was determined by Islamic law to be minimum seven cubits (3.23-3.50 m) in reference to the Prophet's advice "If you disagree about the width of a street, make it seven cubits" so it is wide enough for
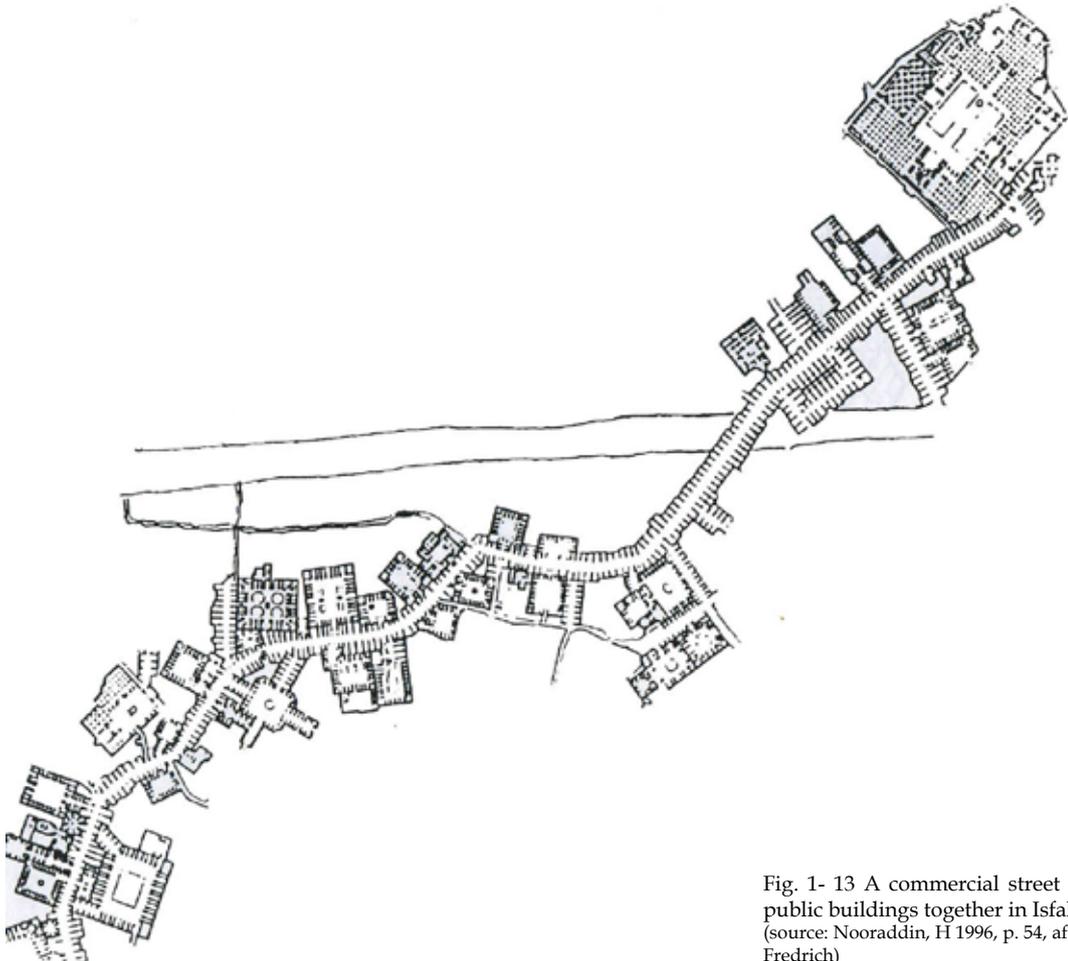
Fig. 1- 13 A commercial street linking all the public buildings together in Isfahan
(source: Nooraddin, H 1996, p. 54, after Geist, Johann Fredrich)

two fully loaded camels to pass without hindrance. In practice, they varied between two and six meters and the width would also vary along different segments of the same street (example: al-Qasabah main street in Cairo).

• **The Private Cul-de-Sacs (neighborhood streets)**
Although they are the lowest constituent in the street system, cul-de-sacs played a crucial role in the development of the cities in the towns influenced by Islamic culture. The cul-de-sac is a path without an exit, it has differing names across different Muslim countries, most common of which include: *zuqaq, zanqa, derb ghayr nafidh* and *sikka ghayr nafidha.*

Measurements: Their width has varied between a minimum of 50-90cm to a maximum of three meters and they link a public street to a residential neighborhood of courtyard tissues accommodating the introverted lifestyle that centered on the privacy of the home and the family (see fig. 1- 12). They either branch out of a second or third order of streets.

Their morphology can be very complex, straight sections can take a sudden right-angle and even a U-shaped turn, covered parts alternating with open-air ones that feel like corridors and occasionally functioning as the neighborhood core, often housing a common service like a fountain or a well; while at other junctures they were bridged by houses which made them look like tunnels [Petruccioli 2007]. Respect for privacy dictated the design of facades along the residential street as well: they were mostly blank walls of the houses that had façades turned away from the street towards the inner courtyards from which the family and their guests could admire the beauty of the house. Windows (when existed at ground floor) along the street were carefully located, usually above eye level (200cm above street level) to prevent views into the houses from the street. The entrances to two different houses couldn't be positioned opposite each other to ensure discretion and had to be located in a way to hinder the view into the inner spaces, especially into the courtyard of the house where the women and children spent much of their time. In contrast to the sheer and anonymous-looking surfaces of the enclosing walls, the entrances were often richly decorated, for instance in Tunis, people were adept at demonstrating their social status by the grandness of their wooden doors that were decorated with rivets and framed by lintels and carved sandstone arches. Differences between poorer and richer houses could be observed from the street through change in elevations' details, length of elevation (plots' sizes) and building materials. The courtyard houses abutting those streets were of differing heights but mostly composed of two to three-story buildings, which fostered different feelings of physical compression.

In the past the *zuqaq* could be closed off from other neighborhoods and the rest of the city by means of a gate, sometimes by

using of several gates [O'Meara 2007] to separate individual houses from their neighborhoods that divided these labyrinthine spaces into many smaller spaces for the exclusive use of particular groups to ensure safety, especially in the evenings. Today although the gates disappeared, inhabitants still make access for outsiders very difficult.

There exist various assumptions about the cul-de-sac type of route, the most convincing belong to Petruccioli (2007) who associates the cul-de-sac, above everything else, with the formation of deep courtyard tissues, believing that the cul-de-sac was a reasonable device deliberately chosen to serve houses in the interior of deep urban blocks (large urban blocks were very typical in early settlements). Petruccioli further believes that survival of this route type is related to the early medieval social order and the desire for exclusion as a tool to contain internecine conflicts, which rendered this type of route layout conducive and in demand [Petruccioli 2007], as it allowed to easily close-off a neighbourhood by means of just one gate [O'Meara 2007].

• **The Collectors**

Between those two types, there were also the collectors (second level in the street hierarchy): they were local thoroughfares of smaller dimensions than the main thoroughfares, that took on pedestrian traffic to the cul-de-sacs and helped in breaking the way from the public areas to the residential quarters into successive hierarchical sections which herald increasing degrees of privacy, **measurements**: up to 3,5m wide.

Sometimes cul-de-sacs branch from the collectors directly, sometimes there are "minor streets" that connect between the collec-

border between two residential quarters

a dead-end street

25m

Fig. 1- 14 Collector streets helping in breaking the way from the public areas to the residential quarters in Fez
(source: Bianca , S 2000, p. 83)
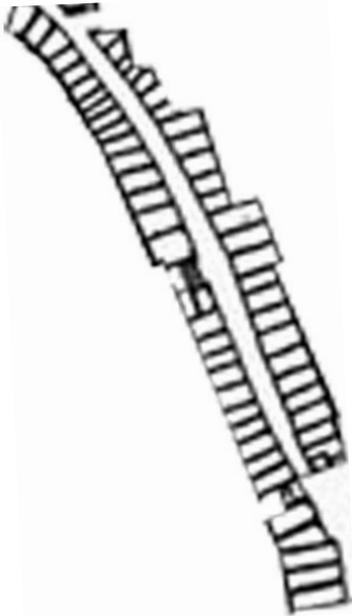
Fig. 1- 15 Plan of a commercial street
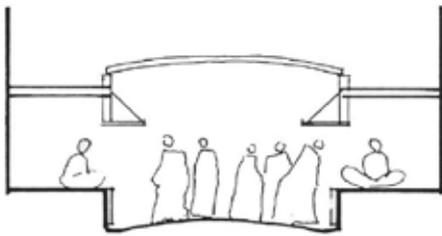
Fig. 1- 16 Section through a commercial street in Fez
(source: Nooraddin, H 1996, p. 55, after Le Tourneau, Roger)

Fig. 1- 17 Vaulted souk street of the iron mongers with skylights in Aleppo, 1935
(source: Sauvaget J, Alep: Essai sur le développement d'une grande ville syrienne des origines au milieu du XIXe siècle, Paris: Librairie Orientaliste P. Geuthner, 1941)

tors and cul-de-sacs.

• **Other Streets & Spaces**
- Covered souks: these are covered bazaar streets that form in webs and are composed of repetitive cells opposite each other and separated by a 10-20ft walkway covered by vaults and lit with skylights at intervals which provides shade & protects from heat in summer and keeps rain and cold away in winter, some souks were only partially covered with the space between the shops covered by a wooden roof or a mat so as to provide some shade

- *Qaysariyyas*: are covered market that housed the most lucrative trade activities, they were either made up of a group of paralell streets and streets crossing them at right angles or they took a shape of a market hall with columns that held the above-head covering and had designated seating. They were enclosed and closed off by gates and completely deserted at night, some were even patrolled by guards. During the Ottoman period hey were given the name "*Bedestans*".

- The *Suwayqa* (a diminutive from suq, plural suwayqat): is a non-specialized market street within a residential neighborhood catering to items needed at every moment, these shops were usually grouped together at a crossroads or on one of the main streets of the quarter (collectors).

- Squares (*Rahbat*): Contrary to general knowledge,smaller and larger squares, articulation points between the main streets in form of a sudden widening of a street or a widening at the intersection of two or more streets that functioned as points of orientation, or nodes along a street or close to a gate which functioned as meeting and gathering places, some surrounded by shops or occupied by artisans. Many of the Rahbats disap-

peared during later developmental periods as they were encr-
oached upon (see figure 1- 23) .
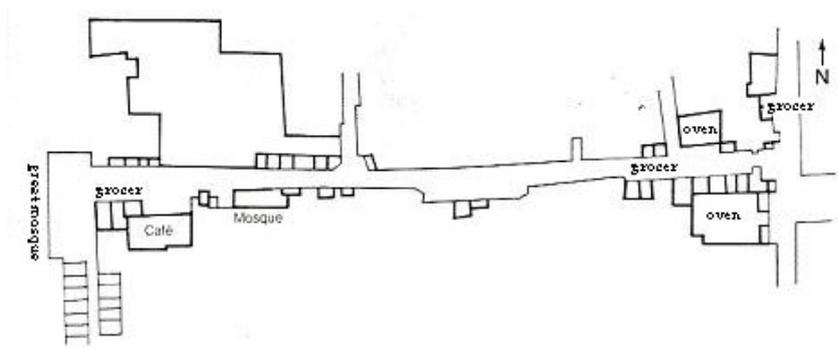
Fig. 1- 18 (above left) Suwaiqa with shops serv-
ing a residential quarter
(source: Raymond, A 2008, original by Sauvaget, Jean)

- _Maydans_: these were open spaces located outside the walls
functioned as open marketplaces and/or forecourts where car-
avans could park and where the army could train but also for
celebrations

Fig. 1- 19 (above) Covered bazaar in Istanbul
with two bedestans
(source: Bianca, S 2000, p. 131)

- Empty plots

1.2.1.3 Urban & Architectural Elements of the Streets
• Urban & Architectural Elements of the Commercial Streets:

Gates
The city walls had their prominent gates that were the entry
points to the walled _medina_ having a strong visual significance;
they acted as turn-over points for the loading and unloading of
wholesale goods and materials brought from the rural hinter-
land, which could not enter the fine-grained system of the inner
city without prior stocking, processing and distribution to retail-
ers. The gates' task was to sift the flows of people and animals
to avoid excessive congestion in the inner circulation system.
Markets in the _medina_ also had their own gates that were meant
to close off sections of souks with most valuable merchandise

Fig. 1- 20 Bab Bou Jalloud in Fez
(source: courtesy of Special Collections, Fine Arts
Library, Harvard University)

Fig. 1- 21 Lightweight roof providing shade in
fez _medina_
(source: courtesy of Special Collections, Fine Arts
Library, Harvard University)
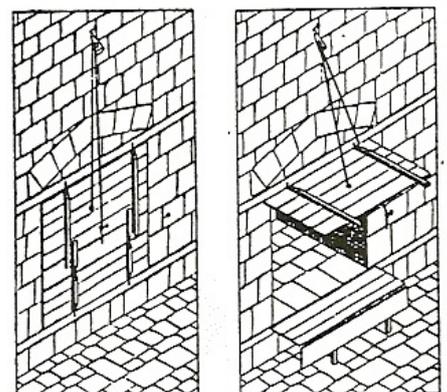
Fig. 1- 22 A shop with _mastabah_
(source: Nooraddin 1996, p. 53, drawn by Sauvaget)

Fig. 1- 23 A meeting point in form of a small square surrounded by shops covering everyday needs of the residents living in the housing clusters of the residential district of Mokhfiya in Fez (source: Bianca, S 2000, p. 150)
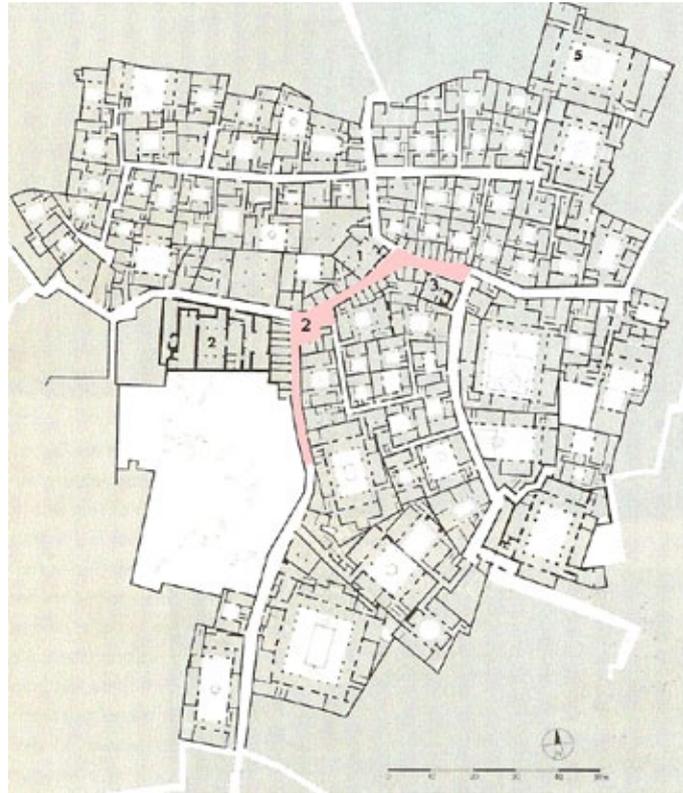
at night, also small gates, discreetly placed between the row of shops, marked the entrance to distinct residential clusters.

Shading Devices

Vaulted roofs:

These adorned souk streets halls with small windows (skylights) in the roof, usually found in the *qaysariyya* and souk streets.

Awnings & Canopies:

Horizontal planes used for providing shade, traditionally made from canvas, tent material, light-wood structures and lattice-work.

Ornamented Drinking fountains *(sabeels)*

Sabeels were public water fountains usually donated by the elites as a charity to the public especially to the poor on behalf of God. They were usually adorned by religious inscriptions (from the Quran or Hadith) and by the name of the donator and beautifully decorated. They were either of the mural type (attached to a building wall abutting the streets like a mosque) or as elaborate structures where a square *sabeel* room occupied the ground floor and another function would be located above (like a room for Quranic teachings located above).

Shop Seating protruding onto the Street (*mastabahs*)

They formed an extension to the interior of the shop extended onto the street space forming benches for shopkeepers to sit on them in front of their shops and in the space of their *fina'*, they were foldable.

Fig. 1- 24 A neighborhood gate in Aleppo in 1935
(source: Sauvaget J, Alep: Essai sur le développement d'une grande ville syrienne des origines au milieu du XIXe siècle, Paris: Librairie Orientaliste P. Geuthner, 1941)

• Urban and Architectural Elements of the Residential Streets:
Residential streets did not usually have façades looking onto the streets, among the most notewrothy elements were:

Gates
Gates were very prevalent, quarters and dead-end streets also had their own doors, if they were on a dead-end street they were called a "*darb*", if they were on a through-street they were called a "*daraba*", some gates had guards who were not supposed to allow late arrivals after a certain hour without demanding a password, but most importantly the gate marked the territory that belonged to the unified form of submission, meaning that residents owned, but at the same time controlled the space enclosed by the gate. In case a resident was careless about maintaining cleanliness in front of his house, other residents were able to exercise pressure on him and compel him to sweep it.

Entrances and doorways (*bab*):
The only elements in a street that could suggest a house owners' status, they were decorated with rivets, framed by lintels, usually with religious writings to keep evil's eye away, sometimes even featured carved sandstone arch. Larger houses could have doorkeepers. A bench could sometimes be built beside the entrance; an iron ring might be molded to tie the donkey to the *fina'*.

Drinking fountains: these were provided by property owners for the benefit of people passing by and moving around the urban areas. They have usually been attached to the outside wall of a residential property or a neighborhood mosque.

Windows
They were of two types: the ground floor ones located normally above eye level or covered by a wooden screen. Upper floors' windows formed projections onto the street and were called *mashrabiyas* (especially in the Hijaz, Levant countries and Egypt), the screen allowed the dwellers to see the street without being seen, it was used also to hang jars for cooling the water, and to reduce the sun and glare penetration. Such projections were situated at heights so as not to obstruct passers-by (pedestrians or people riding on animals).

Elements above the Street:
Overpasses (*Sabat*): A *sabat* is a room bridging over a path (an air-right structure); it lent streets the quality of enclosure, visual interest, but also provided shade and a cool micro-climate.

Buttressing arches: Arches spanning between walls on either side of the street to provide structural strength and support for the opposite walls, these arches gave visual interest by interrupting over-long perspective effects. Although very common they were not used in all Muslim towns.

Planting: There existed almost no greenery, no trees even in
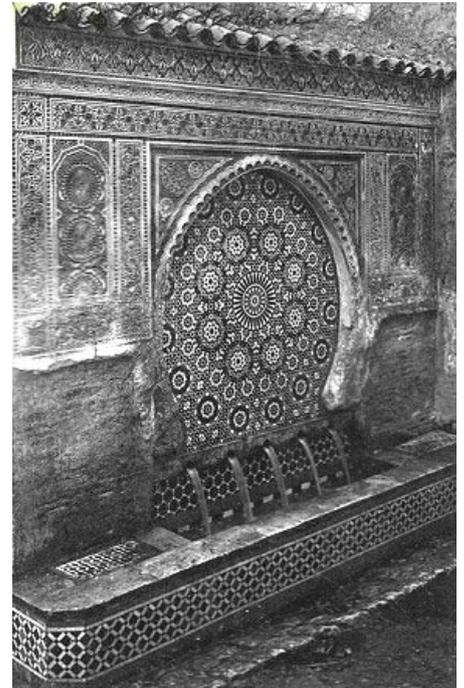
Fig. 1- 25 A public fountain in Fez
(source: courtesy of Special Collections, Fine Arts Library, Harvard University)

Fig. 1- 26 According to Besim, there are two main types of streets: the open-ended (through) streets and cul-de-sacs
(source: Hakim, B 1986, Arabic-Islamic Cities - Building and Planning Principles, London)

fertile lands like Turkey except within private properties (in the courtyards). Only with colonialism did trees become a significant part of the streetscapes.

Mashrabiyyas: Screened windows with carved wood lattice work that project out from the building's façade within the *fina'* space, usually on the street side, located above-ground usually at the second story or higher, allowing residents (especially women) to overlook and observe the street without being seen and allowed cool breezes to enter homes in the heat of summer. Mashrabiyyas were mostly used in houses and palaces but sometime they could be found in public buildings such as hospitals, inns, schools and government buildings.

Fina': As mentioned before, an important feature in streets and cul-de-sacs is the *fina'* (a width of about one meter adjoining the edge of a building and extending vertically along surface of the façade to which the owner or inhabitant has certain rights for using it.

1.2.1.4 Use and Function of the Streets
• The commercial and bazaar streets
In addition to serving as important connectors between the gates and the city core for pedestrian and pack animals' flows, they provided a venue for social, religious and cultural activities, stimulated economic activities and enhanced local identity among the city residents. The *fina'* space of commercial streets served for trading, sitting, negotiating, the entertaining of clients by shop-owners and for displaying goods, which was greatly supported by the typology of smaller commercial shops (units of relatively small depth around 3m², aligned on both sides of a passage that made up the market street). This configuration allowed a high interaction between the inside and outside spaces

of the shops and hence added to the vibrancy of the souks. The *fina'* also housed *mastabahs* (benches for sitting), mobile vendors (temporary or permanent, permanent hawkers had designated spaces in the street called *maqa'id al aswaq* (seats of the market), their establishment requiring consent from adjacent shopkeepers). The *fina'* was also used to tie pack animals and the space was also occupied by men who sat in it outside mosques and *madrasas* (hence extending and linking the inside open spaces of these structures with the outside street space), this proximity lending it spiritual meanings and reinforcing close links between religion and culture and the streets daily.

• **The residential streets**
The ultimate function of streets within a quarter was on the one hand to insure accessibility for the actual neighborhood residents, but at the same time to restrict mobility (acting as interior corridors that adjust the degree of privacy) rather than facilitate it to ensure safety for its residents: According to Daunton and Bianca [cited in Good 2003]those streets and alleys that looked like a maze of featureless cul-de-sacs to foreigners, are in reality coded with a subtle, complex visual reference system of thresholds, transition zones, and buffer spaces which act collectively as filters to keep strangers, outsiders and bachelors out, and the thresholds used were usually things such as arches, low stone posts, piles of bricks, or simply the sudden narrowing of an alley. So as mentioned earlier, residential streets acted as devices serving the social order well in its desire for privacy and exclusion and also as a tool to contain internecine conflicts in earlier periods. Later they were used as a defense against colonizers, who ultimately ordered their removal. They also functioned as a platform for social activities among neighbors and provided safe sheltered areas (playgrounds) for children to play [Çelik 1997] watched over by old men chatting and drinking tea and coffee [al-Hemaidi 2001]. Their narrow cross-sections insured a nice micro-climate and protection from desert winds. They also served for storing possessions in the area of the *fina'* or herd cattle and played a major role (together with courtyards & rooftops) as the dominant public open space in the daily life of the local people serving mainly pedestrians and enhancing local identity.

1.2.1.5 Ownership, Control & Maintenance of Streets
The consensus among jurists was that the streets and all other public spaces were owned by all Muslims collectively, not by the authority. In practice, this meant that any individual may act and change something in the street as long as it doesn't cause damage and no one complains (especially those who used these spaces constantly). Ownership of dead-end streets belonged to the owners and residents abutting the street, having access from it to their front doors, and was controlled by them collectively. It is considered private property, in which an intervention by any neighbor will be permitted if all partners agree [Akbar 1988]. Gates played an important role here, for they enclosed common

places in traditional environments (quarters, sub quarters, dead-end streets, like for example a residential quarter) and marked the boundaries within which people of that enclosed area felt responsible and shared in its maintenance and cleanliness with their neighbors, simply out of convention, without any interference from the authorities.

Akbar (1988) who investigated ownership thoroughly in the traditional Muslim environment has ascribed the streets' morphology and their crooked alignment to the patterns of ownership, which allowed a gradual and harmonious development of the built environment. People were the controllers of their own environments and were free to act within it. But if any intervention took place at the interface between a private ownership and another private ownership, or between a private and public ownerships, then their actions were subject to the control of the community, in this case the users of the public streets if it was public and the residents abutting a private street if it was a residential street or dead-end. People could introduce changes in any public street, e.g. introducing a bench, as long as it didn't cause damage, nor it raised objections from the streets users, if however it resulted in conflict, then it was the concern of Islamic law. This gave residents a bigger freedom and autonomy to act, owners had matters related to their streets in their own hands which meant that they had a certain control over the built environment, and they could resolve many matters through dialogue with their neighbors or the parties involved which fostered interdependence among people. Akbar also defended the fact that Muslim law was not strict and that even when the matter ended in the hands of judges, their arbitration differed depending on the case, sometimes rulings of similar cases varied, in many instances the "rule of precedence" applied to through streets in which previous conditions (older established facts and actions) could continue whereas every new action was immediately questionable. But the more publicly active and the more well-defined the street was, the less likely it was approved. Encroaching on inactive streets however, was more tolerated.

Hakim (2007, p.159) summarized some of the Islamic *fiqh* (jurisprudence) laws he believed have had the biggest influence on the traditional built environment:
"*The basis for action is the freedom to act, stimulated and judged by the intentions for those actions and which are constrained by the prevention of damages to others, however, it is sometimes necessary to tolerate lesser damages so as to avoid greater ones older established facts must be taken into account by adjusting to their presence and conditions, people's customs must be respected and followed, however, time might change those customs and new solutions will be needed*".

There were no fixed judgments. Akbar argues that this kind of "urban self-governing" or as he called it "collective solution making" whereupon people invented their own solutions (mod-

ifications) based on the real needs of the moment, opened a big margin for people's ingenuity and it was always the best solution that prevailed transmitted to others until it developed into a convention. This converges with Petruccioli's assumption that the urban organism always responds to the principle of maximum result and therefore to a formative logic (refer to page 26). Hakim (2007) confirmed this by saying that Islamic laws were thus proscriptive in nature, allowing the liberty to generate solutions to specific local problems, in response to the site and the conditions around it. Equilibrium is established on the site where the "best" or "most adequate" solution is achieved for a specific micro condition at a specific period in time. Diversity is thus achieved in the built environment, so that every locality and street becomes unique in character and can contribute substantially to its identity. This in turn contributes to the richness of the total built environment. People's customs are fully incorporated in the manner they build and can express their world-view in built form. The system also recognizes and adapts to changes in those customs over time.

In addition to the active role in urban affairs played by the judges (as mentioned earlier) who ruled in many issues including the road system (streets & cul-de-sacs), the traditional cities had had also strict urban officials since late 9th century AD, namely the *muhtasib* and the *wali*. The former was the "provost of the markets", whose emphasis was on the supervision of traders, whereas the latter took care of night policing to contain fires in case of outbreak. Residential neighborhoods however had own shaykhs who were chosen among the families of the notables by the residents themselves, their task was to ensure security and order within the quarter and in settling internal disputes, in this they were also helped by the watchmen who guarded the entrance to a gated quarter.

Initially, all interventions by the authority in the Muslim world were evident in the markets. In larger towns, like Cairo and Damascus, the more active the street was, the more intervention by the authority was to be expected. This continued so until mid 19th century including the Ottoman period in which political authorities were responsible for "the public core", however in the provincial capitals which were more central like Aleppo, orders to intervene came directly from the central power [Raymond 2008b]. Under colonial rule, this totally reversed, when all matters relating to building and planning were placed in the hands of the authority.

Examples of responsibilities and control in medieval Arab cities included sweeping the channels for waste water which had been the responsibility of each household and they were held responsible to remind a neighbor of doing the same, this custom was practiced in Tunis, for example. Orders would be given to widen some roads and market streets by demolishing old structures or removing the benches set up in front of the shops that

encroached on some parts of the streets in order o restore the street alignment, ruling would be issued to safeguard privacy and the quality of neighborhoods, to clean the streets and remove the garbage and accumulated soil or to light them depending on its size [Raymond 2000] (usually in bigger and more important streets). In the Ottoman period, on special occasions like the celebration of a Sultan's return, sometimes authorities would order that shops and house fronts be whitewashed and that lanterns be hung at night above the shops. Moreover orders to remove unaesthetic coverings of matting in the suqs or to replace them with wooden ones and to restore fountains and old houses were also common.

1.2.2 Streets of the Colonial, Post-colonial and Modern cities

1.2.2.1 The Modernization of Arab Cities during the 1st Phase of Globalization

European town planning, at least since the sixteenth century, has been increasingly committed to grid plans and the insertion of straight streets into the medieval urban maze. Architectural symbolism of the straight and regular street was more and more utilized for representational purposes and affirmation of class status. In the second half of the 19th century the French boulevard concept continued to emphasize this trend and a new urban public space system based on boulevards, representative public buildings and a series of focal squares dotting important intersections became a major planning feature all over Europe and other cities, and a source of pride especially for the new bourgeoisie. Originally used by horse carriages and conceived for the "people" as places for promenade and leisure, boulevards soon filled with cars, avenues were replaced by arteries and the growing vehicular traffic started conditioning all other aspects of urban life leading to a situation in which the street lost its social meaning as a multipurpose space and town planning became synonymous with transportation engineering in which regular grids of roads with combined infrastructure and sanitation networks became the new structuring elements of urban form [Bianca 2000]. Cutting through the heart of dense medieval fabrics, in the name of sanitization, led simultaneously to the clearance of decayed historic quarters. These interventions were regarded as a positive achievement in Europe until the middle of the 20th century, but already by the end of the sixties the negative results of this approach were becoming apparent. Complete historic centers were cleared for the sake of vehicular traffic; urban life based on dense, walkable and human scale environment became virtually extinguished and substantial parts of an architectural heritage accumulated over centuries were abolished within a few years. Additionally, too much emphasis on centralized urban functions led to extremely crowded modern city centers impacting in turn the well-being of residential use and moving it ultimately to the periphery.

The costs of such actions and the resulting environmental impoverishment was soon realized and a complete reversal of policies occurred in Europe. But regrettably, conventional Western planning principles have managed to creep into Arabic countries, taking place incrementally, first with the Ottoman Empire which acted as a first "mediator" of Western influences entering Arab countries and having a comparatively gentler impact, but later through either external authorities (colonial developmental activities) or by local ones, whether by local rulers, property developers or professionals, who were infatuated by Western technology and modern urbanism, and even after the end of colonization and independence, by the forceful penetration of cultural imperialism. The Ottomans, who already experienced first contact with Western planning models through their capital city Istanbul, started to reproduce these urban models in the provincial capitals of their empire by establishing the first suburbs for their governmental employees. These closely resembled the later established neighborhoods by the colonizers (many buildings had Western architecture but oriental details). Modernization by the Ottomans of Arabic Muslim cities was neither consistent, nor dependent on the importance of the city, and in general resources for the modernization of existing road systems, except for widening major streets, were scarce. In other instances where they initiated redevelopments in existing cities, their interventions were usually on a quite environmentally-friendlier scale than later colonial or post-colonial interventions; the streets that had been cut were usually not too wide (six to eight meters) and the buildings aligning them would be compatible with the original fabric, for instance in Baghdad in 1914, the first so-called "real street" was cut through the historic fabric parallel to the river, namely al-Rasheed Street, with lateral two-story buildings, colonnaded at ground-level. Their moderate height and the careful reweaving of the open meshes, despite introducing new developmental parameters, caused little harm to the then existing urban fabric.

1.2.2.2 Streets of the New Colonial Towns

With the onset of industrialization in Europe, and the awakening of European imperialism, led among other things, by commercial interests and the hunger for new resources and markets, European colonialism eventually spread to the Islamic world. New towns and suburbs were formed through public intervention or private initiatives adjacent to or at different proximities from the historic center and each with a distinct morphology. Naturally, these neighborhoods were modeled on European town planning thereby establishing an altered street life and altered relations between indoor and outdoor spaces, and ultimately very different in character than the traditional environment.

 The results of transferring Western models of subdivision to the Arabic suburban context produced variants which rarely conformed to their original European counterparts, but were rather crossbreeds and hybrids, and often interesting streetscapes resulted aligned with heterogeneous architecture lending its voc-

Fig. 1- 27 Elegant arcades in the Rue de la Marine, a new street created by the French colonizers inside the Casbah, the colonnade was exposed when part of al-Kabir Mosque was demolished showing one row of its interior columns
(source: en.wikipedia, Great Mosque built in the 11th century in the Marine street,creator: OneGuy, 22 December 2004, licensed under Wikimedia Commons

abulary from both Arabic and European forms. Certain solutions and models continued to be chosen for the Arabic context even long after they had become anachronistic in their spheres of origin [Volait 2003]. Colonial intervention in existing *medinas* was basically of two major types (or a combination of both) and varied according to topographic conditions, the geopolitical importance of the site and the cultural choices of the administrators responsible and their architects:

1- Superimposing the new city on the old historic urban fabric, by carving out generous roads, boulevards and sites for major public buildings, and this usually entailed the progressive demolition of historic urban structures to make place for the expanding new facilities [Bianca 2000]. An instance of this is Beirut and Baghdad (see figure 1- 29)

2- Setting up completely new colonial cities on virgin land without seeking any interface with pre-existing urban structures, this led to the "split city" which was polar ized socially as well as spatially where different urban spaces represented binary oppositions- the old city stood for "tradition and local life", while the new catered to European "modern" tastes.

Sometimes this clear separation between the old and new turned out good for the old cities who were allowed to preserve their integrity as it allowed a side by side coexistence of both cities without the need for the new to infringe upon the old fabric, as enough space had been envisaged for its expansion, instances of this are the colonial cities of Fez under French rule, but also Tripoli & Benghazi under Italian rule, where colonialism had a gentler impact. Elsewhere (e.g. Damascus and Aleppo) where the new city was established too close to the old meant that with time

Fig. 1- 28 The colonial ville nouvelle (left) juxtaposed to the traditional *kasbah* of Algiers
(source: Çelik, Z 1997, p. 1, original from *Chantiers*)
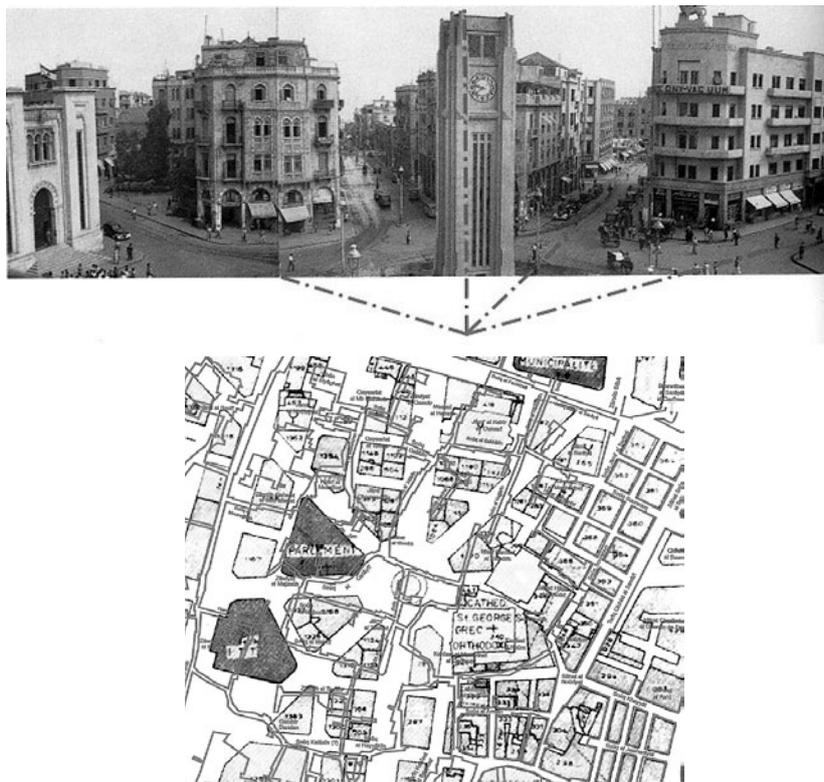
Fig. 1- 29 (a) Bird's eye view of Place de l'étoile in Beirut, (b) Overlay of new streets on the traditional urban structure
(source: Saliba, R & SOLIDERE, Beirut City Center Recovery : the Foch-Allenby and Etoile conservation area, Göttingen 2004)

the growth of the new town and the accompanying pressure for vehicular accessibility would make the extension of traffic arteries into the old historic core become irresistible

Usually new urban quarters had regular impersonal checkerboard street layouts, rectangular grids or tended towards the radio-concentric form modeled on Haussmann's Paris or were a combination of both: an orthogonal grid with a star-shaped pattern. But subdivisions with undulating streets modeled on the English garden city also found their place in Arabic cities, and later, typical American suburban patterns of loops and cul-de-sacs also followed.

• First Structural Changes between Old & New Cities

The traditional urban fabric of Arab Muslim cities consisted of a juxtaposition of blocks and parcels which varied much in size, hence in one block—between its heart and its periphery—or in one parcel between its façade and its deepest point, pieces of land varied in size and property values, giving rise to a tight overlapping of activities and a mix of different social groups [Arnaud 2008]. Yet the importance of land supply for potential urbanization outside the walls had become clear to land owners since the latter half of the 19th century as demand increased especially as European buyers increasingly started to set up factories or other economic activities inside Muslim cities. So the lands were no longer divided according to the wishes of those who might be able to build on them, but were uniformly cut in advance to get maximum revenues. The results of this were subdivisions comprising nearly same-sized plots targeting homogenous categories of clients, thus eliminating the variety in parcel and house sizes that characterized the traditional quarters as well as the

Fig. 1- 30 Figure ground of the garden city at Qasr al-Ali in Cairo, a strictly upper-class bedroom community with no commercial center which was born in 1905
(source: redrawn from a map)
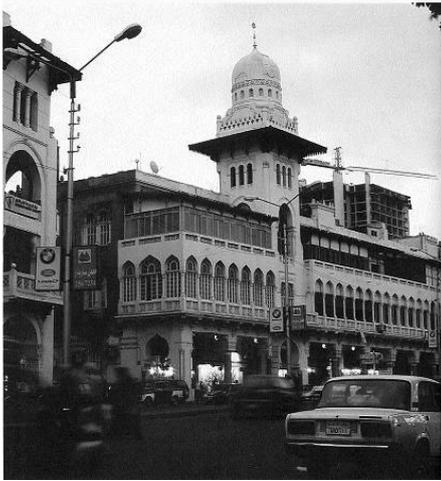
Fig. 1- 31 Architecture in Heliopolis
(source: Ifa 2006, photo by Al-Latif, Marwa)

variety of clientele living side by side [Arnaud 2008].

In the early stages of introducing Western layouts, some colonial powers (e.g. the French) have reproduced the functional logic of the old *medina* by erecting a common type of buildings of 19th century European cities, namely the covered commercial gallery, which in fact reinterpreted the layout of an older Turkish bazaar [Petruccioli 2008]. Furthermore, a gradation could often be observed, in the sense of an increasingly functional specialization from the earliest new subdivisions to later ones, so while the former would rather be mixed-use, the latter would become more functionally specialized (i.e. villas in luxurious residential areas). This could have been indicative of the fact that "zoning" influences were starting to creep in [Volait 2003]. The garden city concept also arrived to Arabic cities; as large residential areas were constructed at the periphery away from the center, and acted as dormitory cities. In general, the impoverishment of the planning design and architecture was discernible over time (from a monumental ordering to a simple gridded pattern) and of the shrinkage of plot sizes [Volait 2003] and the buildings' typological repertoire changed from more elaborately designed apartment buildings to simple skeletal structures [Petruccioli 2008].

Likewise, a total resignation of "neighborhood centers" including community facilities in new subdivisions further highlighted the profit-maximizing approach. All this further reinforced the concept of functional and societal segregation upon which previously integrated land uses were now meaninglessly separated, increasing social costs for urbanization and transport.

Fig. 1- 32 Grids, wide streets, right angles, wide squares and boulevards in Heliopolis, Cairo
(source: Heliopolis Palace Hotel 4, 27 July 2009, creator: Arab Cowboy, Wikimedia Commons)

Characteristics of the Streets and Public Spaces:

In contrast to the traditional urban structure, where only approx. a fifth of the urbanized area was allotted to the road system, the streets in the new quarters were broad, rectilinear and interconnected, built according to orthogonal or radio-centric layouts (with preference to 45 degrees diagonals for boulevards) and were flanked by sidewalks.

Fig. 1- 33 Colonnade in a street in Heliopolis, Cairo
(source: Heliopolis Avenues, 27 July 2009, creator: Arab Cowboy, Wikimedia Commons)

Fig. 1- 34 Aerial view of Heliopolis showing uniform undiffrentiated plots
(source: Google Earth)
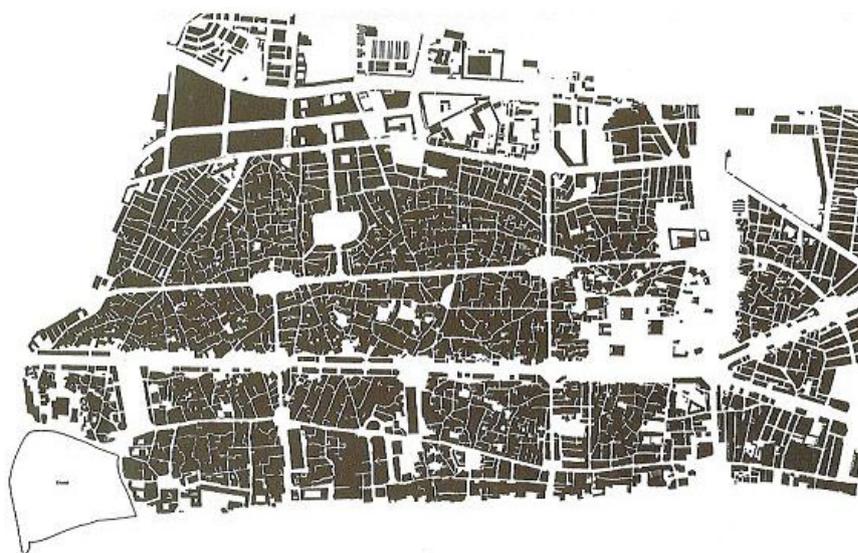
The new urban spaces established in the new quarters outside the *medina* were characterized by openness and maximum accessibility, with extroverted architecture. So there were the commercial streets aligned by two to four story buildings with a mix of uses accommodated across different storys: usually commercial use on the ground floor, offices on the second floor, residential on the higher floors. There further emerged leafy residential streets with free-standing large town houses surrounded by gardens and there were the wide, gallery lined avenues and tree-lined boulevards (up to 114m) dominated by civic buildings like government institutions or by monumental apartment blocks with arcades (like in Heliopolis in Cairo) accommodating trams and greenways in their middle. Planned regular squares and gardens became the main public spaces. Statues replaced *sabeels* in modern streetscapes and free-standing hotels replaced caravenserais [Volait 2003].

Initially, the buildings were parallel to the street, continuous along the whole perimeter of the block, they showed respect

Fig. 1- 36 Muhammad Ali Street cut through the old fabric of Cairo in 1874. The new artery is connected to the surrounding tissue by means of stepped streets
(source: Ifa 2006, photo by al-Latif, Marwa)

for human scale, and were of similar height. Arcades at ground-levels not only provided shelter to pedestrians in hot and rainy weather but they functioned as a unifying element in a diverse streetscape. Shops became larger (deeper), shopkeepers sat inside and became separated from the street by large plate glass-window. Later, in many new quarters the houses started to be set back from the streets and the built-up area coverage was restricted and the houses transformed into different independent units separated from each other and surrounded by elaborate fencing or hedges. Physical planning in Arabic cities was later reduced to a set of standards and laying subdivisions according to certain by-laws which were used to achieve homogeneity in the estates' designs, setbacks and plot coverage were fixed.

• **Restructuring of Existing Fabrics**
In many towns, opening of routes through the historic city quarters in the name of modernization or traffic movement reform has been a recurrent planning approach since Ottoman times, carving out squares (like in Algieria) also took place, whereas opening up of the traditional blind alleys had been also under consideration. For instance, in Cairo five wide streets were originally proposed (according to a Khedival order, Khedive Ismail aspired to turn Cairo into a European city). While some cities underwent radical transformations during the colonial period, like Beirut, with severe repercussions for the traditional fabrics, other cities were more fortunate, where such radical plans aroused protests by some heritage conscious individuals (both local and/or foreign) eventually managing to hinder implementation or at least reach a compromise. Such technocratic transformation of Islamic cities along Western lines has produced many problems that have been well described by Bianca (2000):

- Cutting road channels through the old city fabric and razing many of its historical buildings with disregard to the traditional system and with no consideration to the physical, social and economic impact of such schemes led to the division of the formerly coherent urban fabric into isolated blocks, and exposed the introverted precincts of secluded residential areas to the immediate impact of functions and activities from which they were carefully screened off.

- It also led to the separation of individual public buildings (in some instances some planners suggested that the entire old center be separated by an internal, within the walls, ing road) from the surrounding urban matrtrix, and exposing them (i.e the Friday mosque) as if they were isolated architectural sculptures or monuments that should be exposed to the specttor; corresponding to the idea of "dégager pour mettre en valeur", nothing could be more detrimental to the message of Islamic architecture which isn't primarily intended to be seen from the outside but to be perceived from within.

- Bringing vehicular traffic and congestion to the old dense

center that was primarily pedestrian, this being just a prelude
to a much wider erosion process leading to subsequent steps
of destruction (will be discussed in more detail in the Aleppo
case study in chapter III)

- New roads carved in the historic fabric invite a new scale of
  transportation, whereas they interrupt the traditional protect-
  ing devices that allowed gradual filtering of circulation flows
  by corresponding buffer zones. Furthermore, speculative
  pressures develop along the fringes of new roads, and new
  street-oriented blocks are built according to a foreign typol-
  ogy, often with high-rises overshadowing the old structures,
  affecting their privacy (a very important cultural and social
  concern for Arabs) and their micro-climate (preventing sun
  shine and cool breezes), and eventually berefting the remain-
  ing fragments of the historic fabric from their physical, funct-
  tional and semiotic context, and thus their raison d'être, which
  resides of being part of a larger and significant whole.

1.2.2.3 Streets of the Post-Colonial Cities

The conditioning of Muslim societies by Western models and
modes of governance during colonialism, became ingrained in
those countries to such an extent that after independence, they
were not even subject to critical assessment or even revision, this
was reinforced by the ruling classes and the new elites who acted
as internal agents of Westernization, who probably refused to
criticize those tools that they began to view as potential instru-
ments for securing their own privileges (social and political con-
trol).
Facing a rapid sprawl that was taking place in many Arabic cit-
ies due to a significant demographic increases caused by a ru-
ral- to- urban migration, local planners but also local officials,
often graduates of European schools turned to and eventually
employed the same modernistic tools and planning methods

as those applied by the colonizers or they reached for American models. Moreover, the new nations felt themselves in a way forced to continue the pre-established economic patterns, which had become dependent on international trade structures and were geared to the application of modern Western technology. This growing cultural dependence, in turn, undermined the traditional ways of problem-solving based on social solidarity bonds, leading to the alienation of local people and the questioning of their own creativity and established ways. With time this developed into a complex of cultural inferiority upon which everything Western was directly synonymous with progress, leading on the other hand to the depreciation, abandonment and to a detrimental image of the indigenous culture and the traditional built environment.

The twentieth century accelerated the detachment of the continuous urban fabric and the streets became dominated by cars. Destruction of some historic cities continued during this time (like in Baghdad as a result of the gradual addition of numerous multi-lane vehicular lanes) or nearly vanished like in Kuwait city.

Many new subdivisions required that more area is given for roads, parks and playgrounds. Comparing these patterns with the traditional ones, reproduced at the same scale, new layouts show much lower density, attaining only one fifth of the traditional density. Setbacks icreased further and Americanism emerged in the 1940s, especially the checkerboard pattern has been used extensively in residential subdivisions of some Arabic cities like Riyadh in Saudi Arabia. This produced too monotonous neighborhoods, with excessively wide streets inappropriate to the climatic conditions and with absence of any street life due to auto-domiantion and thus compromosing the traditional lifestyle. Since the streets have become controlled and owned by the municipality, responsibility of residents for their streets decreased.

The front, rear and side setbacks were often criticized as unnecessary by many Arab scholars like Akbar (1988) as they expose too much of the buildings' surfaces to the sun's heat, they are often too small to provide enough space for children's play and in buildings developed on sloped sites in particular, the rear setbacks are often too narrow to provide enough ventilation and likely to develop into refuse dumps and perfect places for breeding of rodents. Front setbacks made the buildings no longer favorable locations for shops and services because of the distance to the street and passers-by, as average trip distances increase which can affect mobility preferences [Petersen 2004]. Otherwise, in other cases streets have lacked any provision of sidewalks and commercial streets became cluttered with an overdose of urban furniture and advertising.

Streets in the informal settlements, on the other hand, are reminiscent of their counterparts in the *medina* with a hierarchy of access and with very narrow residential streets that are almost

inaccessible by cars. The geographic distribution of shops, markets and workshops is not chaotic, it is concentrated on commercial vehicular "wider" streets and on commercial "pedestrian" streets and hardly penetrate to the narrower residential streets which consequently remain protected from strangers and allow them to function as extension of the houses [Shehayeb 2009]. Although in most dense informal settlements with high-rise blocks streets can become too narrow, often unpaved and badly lit with sewage leaks and piles of solid waste, still, on the whole, they propose a reformulation of the popular city, recovering the social role of the street [Denis 1997].

1.3 THE SOCIAL, POLITICAL AND ECONOMIC TRANSFORMATION

1.3.1 The Social Context

Since Islam embedded the religious practice in the routine of daily life of the individual society, it provided a matrix of behavioral archetypes which by necessity, generated correlated physical patterns, so the traditional Islamic cities are strongly influenced by religious and cultural realities. Lifestyle and social structure of the Muslim society had a decisive effect on building and spatial order. Sacredness of family life and the resulting need to protect the private sphere led to the consequent division and separation of public and private spaces as well as the gender segregation between men and women.

According to abu-Lughod [cited in Thys-Şenocak 2008], respect for privacy and gender segregation has been the most significant social characteristic of Islamic culture shaping its identity and structuring of urban spaces, this led her to differentiate between public and private and later adding the category of semi-private spaces. A high level of solidarity existed between people of one *hara* who cooperated with each other, supervised and bore responsibility for its streets and all the children and parents knew each other. Neighborhood solidarity was also expressed in public (mainly religious) and private local celebrations, like weddings, circumcisions and parades. In the souks, the level of sociability was also very high between merchants and clients and between the shopkeepers themselves.

With the emergence of the new towns, with a new extroverted European architecture, functions and amenities, *medina* residents in search of a higher living standard were tempted to move out. Europeans moved to the new villas first, followed by a portion of the Arab elite who collaborated with them (unnecessarily out of conviction). In time, the more affluent and the middle-classes also moved to the colonial districts leaving the old cities behind, emptying them and depriving them of major socio-economic forces.

Due to the incessant demographic and urban growth that occurred in most Arabic cities, the urban poor and mostly rural people started migrating continuously from the countryside and

Fig. 1- 38 The street pattern, accessibility and cross-sections in the unplanned informal settlements like Manshiet Naser in Cairo (on top) are comparable to the original structure of traditional Muslim cities, here Darb al-Ahmar in Cairo (bottom)
(source: Ilberg A, Dichte ist Tradition, Trialog 76, 2003, p.42)

replacing the original inhabitants of the *medina*, these migrants would occupy the old houses, usually dividing the bigger court-yard houses into many smaller dwellings between numerous families, that way the rent was affordable to renters and profit-able to the owners who no longer lived in them. Those houses were also used for other purposes like warehousing or produc-tion facilities. Usually the new uses did not fit the surrounding residential use of the buildings, leading, in most cases, to a fur-ther damage of the infrastructure. Resident densities in many *medinas* have become extremely high, which contributed even more to overpopulation as the rent control system put in place in many Arabic cities hasn't allowed house owners to raise the rent as long as the same tenants occupied the house. This system, al-though well-meaning, has encouraged tenants to stay in the same house for long periods of time, generation after generation even if their job locations were now farther away from the *medina*, re-quiring long commutes. Since the occupants are often poor, they haven't the means to restore the houses, whereas owners are not motivated to do so (because of the above-mentioned rent con-trol), leading to the decay of the housing stock.

Later, local governments have tried to deal with the shortage in housing, which accompanied the economic boom through vari-ous state-housing programs, but in the short and long run they have often proven unsuccessful. The modern new towns and pub-lic housing planned in the desert to absorb growth and protect agricultural land, like in Cairo for instance, have not managed to entice the lower-middle incomed and poorer population to live there and relocate from overpopulated central areas because of various reasons; not only have they been too expensive, but they have lacked sufficient amenities and economic opportunities that would make them partly self-sufficient, added to this, most are distant from the urban core, not connected by public tran-sit, which makes them highly car dependent and consequently unattractive to low income populations. Consequently, after the old cities were too densely populated, they were forced to act on their own and find alternate solutions, and thus informal settle-ments started to form, either on the *medinas*' peripheries or on disputed or subdivided peri-urban land (often agricultural). In some Arabic cities, like Aleppo and Cairo for instance, informal settlements house almost half of the cities' population. Although they formed haphazardly, they have become largely self-suffi-cient districts with an urban form characterized by compactness and presence of an efficient mixture of land uses (shops, mar-kets and workshops) that cater to the essential daily and seasonal needs of their populations, and by work-home proximity which makes "walking" the main means of transportation in those set-tlements, followed by micro-buses..
The result of these developments has been a yet deeper social and economic cleavage between the historic core and the infor-mal settlemets and the modern city extensions, the former stand-ing for tradition or even backwardness and occupied by the

poorest strata of the society and the latter representing modernity and progress, occupied mainly by the rich and the upper middle-classes.

Demography and its Effect on Urban Sprawl in Middle Eastern and North African Cities:
The exceptional rate of population growth in cities of the Middle East is linked to:
- Rural-to-urban migration of people that seek jobs and better life conditions in the big cities, added to this the liberties that these cities can offer with their modern life, commodities and facilities.
- High birth rates (natural growth and increase of births over death rates) in some cases due to a lack of sufficient knowledge about birth control methods in backward and poorer localities.
- Wars and political unrest that has produced several waves of emigration and relocations to neighbouring countries from the conflict zones in the region, namely in Palestine, Lebanon and Iraq

1.3.2 Political Economy and its Effect on Urban Development in Cities of the Middle East
- Economy in the Historic Cities & During the Ottoman Period
The notion of a capitalist economy founded on profit and more especially upon ever-increasing production was alien. The *medina*'s (theoretical) economy was a closed circuit in which known needs were catered for by artisans and traders dealing in known quantities of goods, not in competition but in harmony. But with the onset of western capital economy, new production modes became dependent on imported machinery, construction on "new" and expensive building materials and industrial contruction techniques, thus capabilities of local communities in providing their own shelter were no longer engaged. The problem of housing for the masses emerged.

- The Oil Boom and the Times of the "Hidden" Economy:
Discovery of oil has played a major role in the urbanization in the MENA region, in states where oil was discovered, it facilitated much of the development and modernization directly, whereas in poorer Arab states, especially during the first oil boom of the 1970s and early 1980s, oil money in form of direct transfers between countries, international loans, and workers' remittances that were sent home and were often used to purchase land and build private and commercial projects temporarily alleviated local economic conditions and instigated growth and influenced urban development.
Today, despite the oil- price boom, no regional spillover effects as strong as those witnessed in the past are being witnessed.

- The 2nd Phase of Globalization
The recentorientation of many evolving Arabic cities towards

Fig. 1- 39 Gated community in Cairo
(source: Ifa 2006, photo by El-Khorazaty,
Tamer)
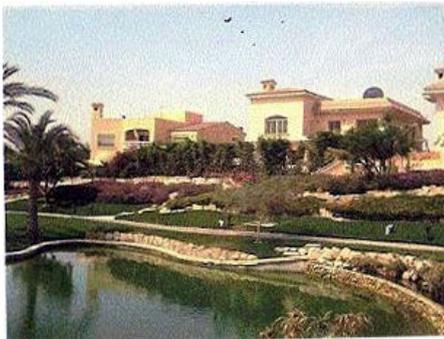
Fig. 1- 40 Luxurious, green living in Cairo
(source: Ifa 2006, photo by El-Khorazaty,
Tamer)

liberating their economy and opening their market to international investment is similar across many Arabic capital cities, as the "Dubai" experience is looked up to and considered as the "path towards success" — economic success. Even those cities which have long been regarded as most conservative, refusing to accept "Western urban models" like Riyadh and Abu Dhabi, have also entered this "race towards globalism" whereupon different cities in the Arab world have been competing with one another in reorienting their policies and using "iconic" architecture and urbanism (exclusively Western) through flagship and mega projects as tools for branding these cities to become or at least seem "global" and thereby to attract inward business and affluent tourism.

The consequence of such ventures have been the proliferation of high-rise towers whose locations have largely been unplanned, pedestrian-unfriendly large scale developments, with no respect for human scale, new CBDs, gated-communities and shopping malls further aggravating the socio-spatial fragmentation and killing the cities' public spaces, not realizing that this model of development is only based on image but not sustainable concepts. The street spaces despite being oversized have mainly catered to the automobile, with little greening and almost no provision for other uses. Furthermore, with these newly created "oases of luxury" and "urban enclaves" a new type of space has emerged, isolated from surrounding areas of decay, namely the "privatized public space" based on a highly selective definition of the public (referred to by Crawford (1995) and cited in Daher (2008). So the air-conditioned and boldly illuminated mega malls and the artificial beaches (like in Jumairah, Dubai) have become the new boulevards of the 21st century and the few public spaces where residents may talk to each other and somehow mingle in current Arabic cities [al-Raouf 2005] [Selke 2010]. Unfortunately however, these are car-oriented developments with privatized public spaces where social distinctions are again prevalent. Such spaces have replaced the corner shop and the hustle and bustle of historic Arab souks where all societal strata once mixed. As al-

Fig. 1- 41 A pedestrian trying to cross a street in
Dubai, a 100km/h city
(source: Gehl 2010, p. 45)

Raouf, (2005) has rightly stated in reference to the new spaces in Dubai: "By making interior spaces larger and more comfortable, escaping them becomes more difficult". Hence they are becoming a threat to the traditional and inclusive public spaces.

Attempts to open the real estate market of the *medina* to international investment, on the other hand, has proved also disastrous, as it invited "another wave of colonialism" as many westerners have bought houses in the *medina*, mostly for vacationing, and thus have been replacing the indigenous population, this took place for instance in Marrakesh. Other *medinas* trying to avoid the same fate, like in Tunis, have issued laws that have made the process of purchasing homes by foreigners difficult, and encouraging "local" investment instead in an attempt to keep the *medina* for its original people [Binous & Jabeur cited in Escher & Schepers 2009].

1.4 THE URBAN AND TRANSPORTATION REALITY TODAY

Although different Arabic cities underwent different paths of historic, socio-economic and political development, many contemporary MENA cities nevertheless share some common denominators and challenges. Burgeoning demographic and urban growth, inadequate planning and the shift towards modernization has often contributed to spatially divide Arabic cities along lines, first of caste and later by income and social status (e.g. Amman, Rabat, Cairo), leading to increasing social polarization, negligence of the historic centers (as government efforts have mainly concentrated on the modern urban areas since housing in the *medina* has been viewed as insignificant in size) and to a decrease in socially-mixed public uses. Now major Arabic cities have acquired polycentric urban structures in which historic *medinas* ceased to be the main identity conveyors, as there formed new district centers and other important city locations.

Even today, there are still no legislations for conservation and preservation put in place; ad-hoc destruction of sections of souks or building stock by bulldozers is common, land projects that "pay more" get approved, and present populations have little or no awareness of the heritage value of their properties or the cities they inhabit. More and more palaces and houses get converted to restaurants and hotels without reflecting on the consequences, planning guidelines and adequate human resources are lacking. Problems resulting from intensive land uses, that are also polluting and in conflict with the residential use, demand much transportation and lead to gridlocks and conflicts between pedestrian and vehicular traffic and in some *medinas* like Cairo, to the relocation of important institutions from the inner city towards the new towns because of the unreliable accessibility.

1.4.1 Urban Transport Modes
Public Transport
All the above triggered a high demand for urban transport. Pub-

lic transportation in most Arabic cities has been underdeveloped, private operators providing special transport services for employees and students have flourished instead, to the detriment of public services and have since been playing a key role in public urban transport with several thousand vehicles in each city accounting for a significant number of motorized trips, urban and peri-urban. In cities like Morocco, Cairo and Damascus mini or microbuses are used, vans in cities of Algeria and serveeces (shared taxis) in Beirut & Amman. Their success stems from their capacity to adapt to users' needs; however, they also contribute to traffic congestion and pollution in high-density urban zones and their fees weigh down family budgets [Houpin 2010].

Walking & Cycling
Although walking constitutes the most common means of transportation accounting for 30 to 56% of the trips surveyed [Houpin 2010], it is shocking to see the neglect it has been receiving in the planning agendas of most Arabic cities. Besides being a natural mode of transportation for short trips, pedestrian transport is sometimes used for longer distances in replacement of deficient public transport, or by certain underprivileged groups whose purchasing power is too low to pay public transport fares. However the conditions of pedestrian movement are extremely difficult; pedestrians have to fight their way as they do not enjoy priority and traversing main streets poses risks to their lives. The few pedestrian-related initiatives so far, have been focused on erecting pedestrian bridges over excessively busy streets which have become nothing more than a great nuisance by even the most able-bodied pedestrians and installing guardrails to keep pedestrians from the roadway in downtowns.
Contrary to other regions in the world, there are practically no bicycles, except in the *medina*, but in some cities (Sfax in Tunisia, Moroccan cities, etc) motorized two-wheelers are present, but their use tends to be on the decline.

Vehicular Traffic
The urban road network has many problems in terms of capacity, structure, and management of intersections. The diagnosis reached for a city in Morocco could apply to most Arab Mediterranean cities: inadequate capacity of the main axes of the primary urban road system, a lack of bypass roads, an unstructured network (no defined road hierarchy) deficient traffic management in urban centers (deficient operation of intersections, inadequate signs and signals) and a lack of parking policies.

1.4.2 Characteristics of Today's Arabic Cities Affecting Travel
Population Density
Despite urban sprawl that could be expected, in the best case, to attenuate the overpopulation of the inner cities, densties of the built-up area in many Arabic cities like Cairo, Beirut and Casablanca are still above 200 inahbitants per hectare [Chaline 2001]. In another source the gross densities of Cairo have been estimat-

ed at 400 pph [UNCHS cited in Acioly 2000], the urban density of Tunis city at 92 pph [Houpin 2010] Damascus at around 200 pph [JICA 2009]. By worldly standards, densities of more than 100 persons per hectare (pph) are already considered high (by calculating the urbanized area only, including roads and excluding water bodies, large parks, agriculture and other non-urban land uses). The average population densities are even higher in the informal settlements of Arabic cities reaching 500 pph like in Cairo [Séjourné cited in Séjourné 2010], but many house as many as 800 pph like the case of some informal settlements in Damascus and in extreme cases up to 1500 pph like in Cairo.

In the new residential suburbs and new towns that emerged at the peripheries, on the other hand, densities can range from 50 to 105 pph.

Car Dependence

Motorization levels (number of private vehicles per 1,000 inhabitants) in Arabic countries are on the whole relatively low compared to other regions in the world (between 70 and 160 vehicles per 1,000 inhabitants). The situation, in constant evolution, varies slightly depending on the city. Beirut and Amman are exceptions with a very high rate of 350 and 178 respectively, whereas Cairo has only 34 vehicles/1000 inhabitants). Nevertheless, a trend towards a strong increase in motorized transport is observed in most cities due to policies on the liberalization of imports, higher incomes, and the aspirations of middle classes eager to own an automobile. Although car dependence is comparatively low, urban transport policies have been auto-centered, favoring individual cars through the proliferation of projects and undertakings focusing on road and highway infrastructure and the segregation of automobiles and pedestrians.

Land-Use Mix

The traditional urban form reveals, even today, a high diversity of activities and mixture of uses, the colonial urban form also reveals such healthy diversity whereas later subdivisions have adopted a rigid functional separation of housing, public facilities, traffic and open spaces. New towns and suburbs emerging at the peripheries are planned with no or insufficient employment centers so they do not enjoy autonomy and as they are not serviced by public transportation, they exert heavy pressure on the "mother city". New Cairo City for instance, a new satellite city of Cairo, located in the desert, has been planned for 2,5M people (1st building phase: 1,5 M) but the plan did not foresee any linkage to public transportation, as the sale of land in the desert did not make it financially affordable for the city to lay any additional infrastructure besides the basic road network [Ifa 2006].

Despite a slight awakening, mainly in North African cities like Tunis and Casablanca, where tram lines are being installed, integrated transport/urban planning approaches are still few and far between, the trend is towards highly "functionalist" urban

development practices, particularly through the importation of generic urban products, which are inspired by international standards and are car dependent to the detriment of the creation of public space [Houpin 2010].

As mentioned earlier, many informal settlements are largely self-sufficient, with all essential needs, including affordable goods, reachable within walking distance including a large portion of jobs. This saves people money, reduces energy consumption and pollution, but in many cases means also scarcity or lack of open space and space for additional amenities.

Age Structure:

MENA countries have an extremely young age structure. According to a report prepared by the Arab Urban Development Institute, children represent 40% of the total population in MENA and one third of the 34 million children living in urban areas are poor, by 2025 the child population will increase by 30% [Nour, Hamid & Awadelkarim 2005]. This poses big challenges for provision of services and facilities for children and youth including their ability to access these facilities.

Poverty:

Despite the high oil prices, poverty data indicate that one in five persons in the MENA region could be considered poor, and that there exists a considerable diversity between different countries, for instance poverty rates in Egypt and Yemen are more than twice as high as the regional average. Poverty rates in cities are usually lower than in rural areas, but inside cities it is historic cores (*medinas*) and informal settlements that house most of the urban poor and lower middle-classes [Bigio & Licciardi 2010] .

1.4.3 Street Uses & People's Activities in Muslim Cities Today (Culturally-based Human Interaction with the Outdoor Environment in Muslim Cities)

For anyone who wants to plan or upgrade streets in Arabic cities, it is of utmost importance to gain knowledge about the street culture of these cities: how have people interacted with the outdoor environment historically? how did people use the street space in the past? Do they use their streets similarly today?

A major contribution of research on this topic comes from Nooraddin who focused on studying the outdoor activities in contemporary Muslim cities. Nooraddin (1996) aimed to show that people in Arabic Muslim cities have certain requirements from their urban environment and that there are certain activities carried out in the public street space intrinsic to the Arab urban culture. The traditional act of modifying the streets (intervening in the *fina'* space) by people has persisted historically and has not vanished in present Arab cities. He sees those modifications or uses of the street space as a way in satisfying their social and spiritual needs. Unfortunately these needs are being neglected in today's street environments, as the planning authorities do not take actual users' needs into account, accordingly people resort

to modifying their environments by themselves to fill this void. His investigation of how people use their *fina'* spaces today, has revealed that street uses have varied among different socio-economic groups and quarters. While the low and middle-income people use the streets and create a myriad of "settings" for social and religious purposes, people of upscale neighborhoods consider traditional use od the streets like "dwelling activities" in the space of the streets as unacceptable behavior that belong to lower social classes, settings also varied between commercial and residential neighborhoods. This disparity in using outdoor spaces, Norraddin thinks, could be related to the high density of middle and lower income neighborhoods, where people feel suffocation in their small flats and treat the streets as their open spaces and playgrounds.

The interesting aspect about Nooraddin's work is that he started by observing people's behaviors in the streets of different Muslim cities and wanted to understand why they behave and utilize the streets or more specifically their *fina'* the way they do, and by studying people's behaviors he was able to successfully extract essential cultural substructures dictated by religion, tradition and climate, and to point out to the multifaceted activities and behavioral systems in the *fina'* space of streets, for he studied different Muslim cities including Mecca, Arbil, Cairo, Istanbul, enabling him to notice that people, despite some small differences, utilized, modified, and created their own settings in the *fina'* of their streets in similar ways, and the common denominator to their behavior was Islam and its traditional way of life. In the following, the most notable contemporary settings in the *fina'* reflecting culturally-based environmental-behavior interaction are summarized:

Close Social Interaction in the Street Space: Vendors in traditional Muslim cities continue to have a close and direct relationship with their customers as well as other merchants on the same streets. They don't want to be isolated in closed "boxes" behind shop-windows, screened off from their neighbors (i.e. other shopkeepers) as new designs nowadays dictate, instead, they prefer to pull out a chair onto the street, watch and be part of the street's hustle and bustle. So two of the most important socio-cultural substructures are privacy of the residential sphere, and the need for socializing & building contacts especially in commercial streets).
Also sitting in the space of the *fina'* of recent residential streets in outdoor coffee shops in commercial streets for socialization has been very common, displaying goods, placing flower beds and planting,

Instal *Sabeels* (drinking fountains): traditionally, before there were any waterlines, a religious custom was to build water fountains as a donation or "good deed" to benefit the people and this was often associated with mosques and Koran schools that had

them integrated in their *fina'*s so that pedestrians may benefit from them. This custom has persisted up until now and meaningful substitutes have been created by shop owners who place a water jar in front of their shops and also by mosques provide a drinking fountain embedded in their perimeter wall for pedestrians . This can mainly be observed in the historic quarters of Arabic cities, but it is even practiced nowadays in modern quarters of new cities like Dubai and Doha as well. Sometimes the *sabeel* is part of a coffee-shop, giving passers-by the chance to sit and relax there.

Accommodate Street Hawkers: The sapce of the commercial *fina'* has been usually occupied by shop displays but also by mobile vendors and hawkers squatting with their displays in the streets have been an intrinsic element of the streets in Muslim cities. Today they persist in the popular markets and streets of the city center as well as the informal settlements and offer necessary cheap food and mainly serve low-income customers.They either have permanent booths or are mobile and usually occupy the sidewalks and are often being chased by the municipal authorities who forbid them to sell on certain streets. In some cities, like Cairo, they are given permits by the authorities and have to adhere to certain rules like where they can sell, the size of their booths etc.

Religious-Related Activities & Settings: most shops hang ornate plates with verses from the Koran and the Prophet's sayings on their shops decorating their outer and inner walls, to demonstrate their piety, to convey their identity publicly or to remind other people in the street about Islam.
Praying: As many mosques are located off-street, their yards and front gardens are opened towards the street and worshippers will pray in the mosque, in the yards and sometimes on the sidewalks in front of the mosque. The Musalla is yet another room that opens towards the street that is funded by residents as a place for praying in case no local mosque existed in their quarter.

Other Street activities:
Streets of low-income districts are central to many activities, including weddings, death observances, play, social gathering and staying activities.

1.4.3.1 Why Pay Attention to People's Needs in the Street Environement?
The importance of paying attention to "people's needs" in the design of outdoor spaces is testified to by the difficulty authorities experience in Arabic cities in convincing lower income people from the city center to take up accommodation in the available public housing complexes at the peripheries. In addition to the high prices that dissuade, poor people mainly fear missing out on the social solidarity they are accustomed to in the dense downtown areas. An architect and a sociologist from Cairo for

instance, describes what a cultural difficult experience it is for people to relocate from the city center to the modern housing complexes; people prefer to stay in the downtown because it has "spirit" and for them it is the "people and social contacts" that embody the geometry of the old city where they can rely on a valuable pattern of relationships established over many generations, something that they will miss if they moved to the modern housing complexes that are perceived by them as being "lonely and cold", where apartments are assigned randomly rather than according to residents' pre-existing family and social affiliations. One does not know his neighbors and doesn't feel responsibility towards his neighborhood and it takes lots of effort and many years to establish cooperation. Furthermore, authorities impose laws barring hawkers and market stands from the streets of public housing areas to prevent congestion, this imposes an unfamiliar pattern of neighborhood organization on residents who are accustomed to purchasing modest food needs in front of their houses or at a short walking distance [Doughty 1996].

Summary
Streets and outdoor urban spaces in Arabic cities are very diversified as a result of the unique urban form of Arabic cities and the successive periods of urban development. The specific structure of the traditional medieval nucleus makes it extremely sensitive to and largely irreconcilable with vehicular traffic. The traditional street networks have narrower streets than theirs counterparts in the medieval European cities, and unlike the latter, they possess a hierachy of streets that filters accessiibility and protects the privacy of residential neighborhoods. Later development periods saw European-influenced perimeter block developments with extroverted mixed-use buidlings and finally to monofunctional modern subdivision developments.

Looking at the agglomeration level of major Arabic cities today, one finds a patchwork of economically stratified districts: on the one hand there are modern suburbs, new towns, satellite cities, exclusive residential areas and gated communities mainly catering to the upper-classes, also newly constructed or reconstructed CBDs at or near historic downtowns (like in Amman and Beyrouth) that have also targeted the upper-income populations), on the other hand we find urban traditional cores that depsite being the repositories of Arab invaluable cultural heritage are housing mostly the poor population with deteriorating housing stock, informal settlements dispersed all over the agglomeration and built on scarce agricultural land housing lower-middle and low income populations.

Amid all the above mentioned threats, there also have been some rays of hope, as independent and counter-initiatives, policies of regeneration and renewal of the urban fabric show a promising course of action (counter-initiatives to the profit-oriented mega-projects) which aim to contain urban sprawl and improve the quality of life "for the people", i.e. all people equally. The

two following case studies will shed light on some of these new attempts and are intended to highlight urban street problems and elaborate on planning practices as well. Although dissecting the planning initiatives has exposed many shortcomings of these planning measures, many are nevertheless good steps in the right direction. Many of the proposals in the new master plan of Amman and in the historic city of Aleppo serve as good urban design examples that can serve as models for other Arabic cities.

Chapter II

STRATEGIES FOR THE IMPROVEMENT OF STREETS WORLDWIDE

Chapter II Strategies for the Improvement of Streets World-wide

2.0 INTRODUCTION

Many of the same accessibility and urban mobility problems faced by Arabic cities today have been faced and dealt with by Western cities since the 1950s. Western cities that have undergone rapid industrialization since the 18th century were the first to experience the blessings of industrialization, but were also the first to be confronted with the burden brought about by burgeoning car-oriented urban growth and urban sprawl. It is also out of European city spaces that car traffic was effectively squeezing the rest of urban life by simply filling all available city spaces with moving and parked vehicles. European cities were not spared either the inhuman city spaces that emerged as a result of adopting the ideology of modernism that compromised the human dimension of their urban spaces and depopulated some of their historic city centers. European historic cities, like Arabic cities today, have also experienced an identity crisis, 50% of the commercial retail space relocated at some point to greenfield sites and the inner city (historic core) as a living space and symbolic center of the city became increasingly at risk.

Since the sixties and seventies of the twentieth century a new approach in Europe has made an attempt to resurrect urban streets for the people and transform cities from ones that are auto-oriented to ones that are city and people-oriented. This resulted in European cities acquiring broad experience implementing traffic calming.
In search for urban solutions for the Arabic context, it is natural to attempt to study these international experiences of the very places that have served as testing grounds for half a century now and eventually became the birthplaces of various innovative new urban planning concepts and strategies. Such a study will allow Arabic cities to take a short-cut (and save time and resources) to avoid repeating the same planning mistakes and adopting concepts that have proven helpful, but above all provide useful ideas in order to build upon what is already known to work before tailoring these solutions to the specific conditions of Arabic cities and their culture.

In the following pages, a literature study will be presented that provides a concise overview of international knowledge and experiences with traffic-calming and street design concepts aimed at finding a workable balance between the different uses of the street as a meeting point, marketplace and traffic space and reducing automobile-dependence. Traffic calming, initially a vaguely outlined idea, has become today a term describing and including a whole bundle of organizational, physical and traffic regulating measures aiming to reduce the ills associated with motorized traffic in terms of the traffic situation, urban development and

the environmental quality in the communities.

Throughout the chapter, it has been attempted to maintain a chronological order of the different developments tackling sustainable street design, but it is important for the reader to differentiate between the approaches that have addressed or attempted to find solutions for existing neighborhood streets, built-up areas or city centers and the concepts that have been more preoccupied with organizing movement in new developments, neighborhoods, suburbs or whole new towns. Another important aspect to bear in mind is that throughout the long history of traffic calming, two contesting trends have had the lead to this day:

- Concepts favoring the separation of modes, users and even land uses in street design, professing horizontal separation as well as vertical separation

- Concepts propagating the sharing of the space between all its users, mingling them and mixing land uses in order to make them socially and economically sustainable

2.1 City Traffic in Change & the Rise of Comprehensive Planning

2.1.1 Streets of Antiquity and the Medieval Period

It is believed that the prototype for today's modern street design is the Roman paved street with its elevated sidewalks [Southworth and Ben-Joseph 1996]. Interestingly, even before the Romans and Greeks, in the ancient cities of Mesopotamia, Egypt and the Indus Valley the grid plan had already been applied and distinction had been made between principal streets and the alleys onto which houses fronted [Kostof 1991]. In Roman cities concern for the well-being of pedestrians even existed and attempts to limit certain types of transport modes in some city areas and the accompanying noise (especially in central districts) was common. For instance, streets in Pompeii are proof of the first traffic management devices which were utilized to prohibit the entry of horse-drawn carts to certain streets and the same devices were used as stepping stones for pedestrians as well, to avoid running rainwater, human and animal waste. It is also known that wheeled traffic was banned from the streets of Rome during daytime, a regulation which had later been extended to the rest of Italian towns, and later even to most towns of the Roman Empire. Also the first road hierarchy emerged when Augustus fixed the main intersecting axes of the grid, by designating the east-west axis, the *decumanus*, a processional road with 12.2m and the perpendicular main north-south road, the *cardo*, was set at 6m [Southworth and Ben-Joseph 1996].

With the collapse of the Roman Empire the cities fell into decline as a result of the breakdown of administrative and political systems: public spaces of streets were encroached upon, so the clear
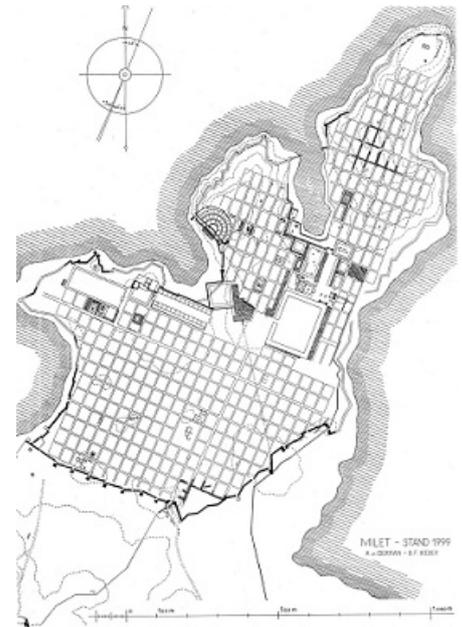
Fig. 2- 1 The use of the grid plan in Miletus, ancient Greece around 479 B.C.
(source: Gerkan Av, Die Stadtmauern, in Wiegand Th (ed.) Ergebnisse der Ausgrabungen und Untersuchungen seit dem Jahre 1899, vol. II, booklet 3, 1935, plate 1)

Fig. 2- 2 A paved street in Pompeii with sidewalks and stepping stones: a prototype for today's modern street
(source: Anderson, GL 1971, Pompeii Road, 20 June 2008 via newworldencyclopedia.org, GNU Free Documentation License)
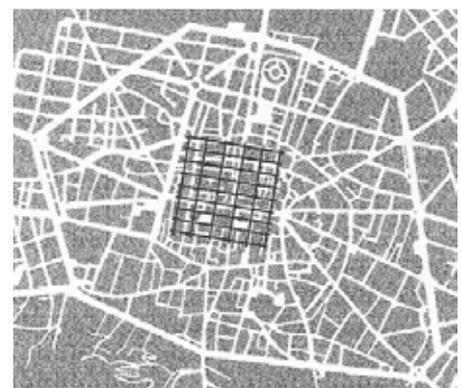
Fig. 2- 3 The Roman grid still evident in the medieval urban structure of Bologna
(source: Southworth & Ben-Joseph 1997, p.14)

and regular Roman grid started to disintegrate and the perfectly paved Roman roadways deteriorated into an impassable poorly-drained system of dirt roads, halting long distance vehicle travel. Medieval European Cities acquired defensive walls and a few major streets led from the gateways to a focal center. Local internal streets on the other hand had informal, unpredictable spatial qualities as a result of rather spontaneous development. They were narrow, winding and with time also became crowded and filthy, aligned by ever higher buildings due to the difficulty in horizontal expansion because of the cities' confinement by walls and absence of public controls. Parisians, for example, were even allowed to throw garbage from their windows after shouting three times to warn any passers-by.

It was not until the revival of interest in Antiquity during the 13th century that the importance of well-laid streets was again stressed by architects like Scamozzi, Alberti and Palladio [Southworth and Ben-Joseph 1996]. Fragments of the Roman grid can be still discerned in the medieval layouts of many cities like Bologna and Verona today, which were originally built by the Romans.

2.1.2 Streets of the Renaissance & Baroque Eras

In the following Renaissance times, straight long streets would be consciously inserted in the medieval city maze for the love of their simple form and in favor of the dramatic perspectives they opened towards monumental buildings (churches and palaces), but also for the ease of control that such streets provided in times of civil unrest. A famous example is the via Nuova in Genoa aligned with grand palaces of the merchant class.

Climatic and technical concerns in the design of streets were expressed by recommendations to construct porticos on both sides of the street whose surface was made concave to ensure drainage whereas the pavements themselves sloped towards the street [Southworth and Ben-Joseph 1997]. Later when the use of wheeled traffic suddenly increased, new bourgeois gridiron suburbs emerged in many places as additions to the old cities with wide orderly network of streets. Instances of this are the Renaissance extensions of Florence, Berlin and Vienna.

Also during the Renaissance the "Allee" was born (a pathway lined with trees used for promenading and games) which sometimes extended beyond the garden like the Avenue des Tuilleries, that extended from the allée of the Tuileries gardens and was the prototype of the Avenue des Champs Elysées.

Baroque planning, however, introduced some innovations to the Roman Renaissance planning model, namely the avenue and the use of grand diagonals within a regular grid, as well as a monumental scale in space and architecture. While within the Renaissance tradition, the buildings defining the streets were considered as independent entities, Baroque urbanism added to this element of urban design first the notion of continuous planes, and then the notion of continuous uniform façades [Kostof 1991].

Fig. 2- 4 Via Nuova in Genoa, an early example of the Renaissance straight street
(source: www.wikimedia.org, original photograph taken by Celestino Degoix before 1890, 21 June 2009)

Fig. 2- 5 Expansion of Florence during the Renaissance with straight streets crossing at right angles (in red)
(source: Winkler B, Stadtraum und Mobilität: Die Wiedergeburt des öffentlichen Raumes in Italiens historischen Städten, Stuttgart 1998, p. 155)

A good embodiment of Baroque principles is the Washington city plan of 1869 and this model was influential on the later redevelopment of Paris. During this period two types of streets were born, namely the avenue and boulevard, which are nowadays considered interchangeable. Initially the boulevard was a promenade that was built on the city fortifications, marked the boundary between the city and the country, which evolved into a public promenade and a recreational zone, accessible to pedestrians and carriages, at the edge of the city. Avenues were originally abstract and straight country roads lined with tall trees to distinguish them from the surrounding undulating landscape with field crops, low hedges and leafy forests that led to important features like a village, a farm, an aristocrat's estate or a hospital at the city edge. Later both street types became urban arteries that acquired new design features like underground drains, sewers, macadam paving, house numbering, mail boxes in addition to sidewalks.

It is also noteworthy to mention that until the late nineteenth century, all cities were car-free.

2.1.3 Haussmann's Modernization of Paris
Baron Haussmann's recreation of Second Empire Paris between
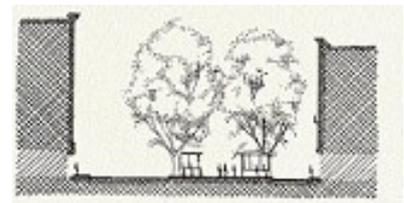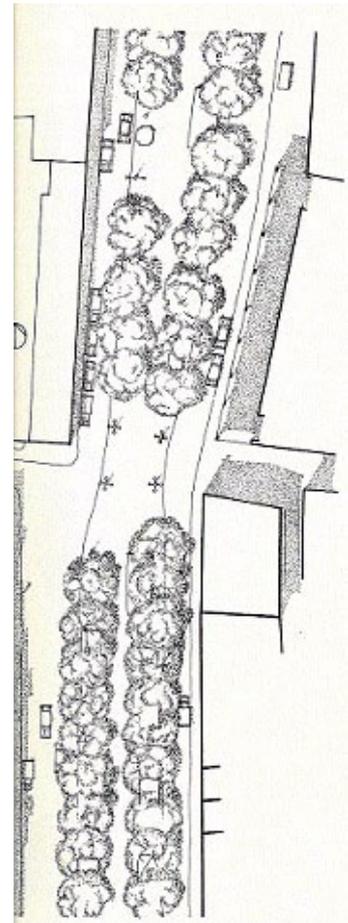
Fig. 2- 6 (above left) View of the pedestrian middle section of Las Ramblas with Kiosks, outdoor cafés and flower stalls

Fig. 2- 7 (above) Plan and section of the 1,5 kilometer-long Las Ramblas Boulevard in Barcelona, with an 11-24m pedestrian promenade placed centrally (in reversal to the norm) and with roads for cars (single-lane each and a parking lane) pushed to the sides. Already by 1856 the street acquired the form it has kept to this day
(source: Jacobs A, Great Streets, Cambridge MA 1993, p. 76)

Fig. 2- 8 L'Enfant's plan for Washington, D.C., as revised by Andrew Ellicott (1792)
(source: Kostof 1991, p. 210)

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Fig. 2- 9 Figure ground plan showing the avenues converging at the Place de l'Étoile which were part of Haussmann's renovation scheme (source: Jacobs: Great Streets, Cambridge MA 1993, p. 234)

1853 and 1870 belongs to the greatest urban interventions in the world; in an attempt to improve Parisian traffic circulation and boost economic growth, as well as to have control over potential revolutions, Haussmann introduced big-scale boulevards that were, until then, strictly suburban, to the medieval city by piercing it with 137 kilometers of wide and straight new avenues (restructuring routes), demolishing as a result over 12,000 of structures. This probably was connected with the maturing of the medieval city's form and the emergence of a new urban pole which needed to be connected. At the junctions of the many tree-lined boulevards, large squares as well as gardens were created. In addition to the new street pattern these radical interventions encompassed all other aspects of urban planning like provision of new city facilities, public monuments, sewer systems etc, shaping the city's uniform image to this day as Haussmann's street network lined with multi-family apartment buildings (five to seven stories) is still the backbone of Paris' urban body today.

2.1.4 Traffic Management in New Towns and Residential Environments of the Industrial Era
The Garden City

The Garden City is an urban planning concept that appeared as a reaction to the motor age and urban overcrowding of the 19th century city centers, it was an escape to nature, an attempt to disperse the population from the city center to a more idyllic form of living in a small self-sufficient town or village surrounded by a green belt at the outskirts of city centers and houses with theirown producing gardens. This model mostly featured radial streets terminating at common areas or facilities and curvilinear streets on which the majority of homes were located. The street network was disconnected from the surrounding to dissuade through traffic from entering. Notable examples were the Letchworth and Hampstead Garden suburbs in England. This model was later adopted in the U.S. (Radburn) and constituted the basis for most American suburban developments. This branching, tree-like "dendritic" network, characterized by low connectivity was composed of arterial, collector and a local street and it became widely applied by traffic engineers who believed it to be a good solution, for it reduced the points of intersection and conflict, eliminated through traffic and insured quiet residential

Fig. 2- 10 Boulevard of Sébastopol in Paris as it looks today
(source: Wikipedia.org, photo by Thierry Bezecourt, licensed under GNU Free Documentation License 1.2, 18 January 2006;)

Fig. 2- 11 Early view of Hampstead Garden Suburb showing an unpaved street shared by pedestrians and vehicles alike
(source: Southworth & Ben-Joseph 1997, p. 46, original by Raymond Unwin)
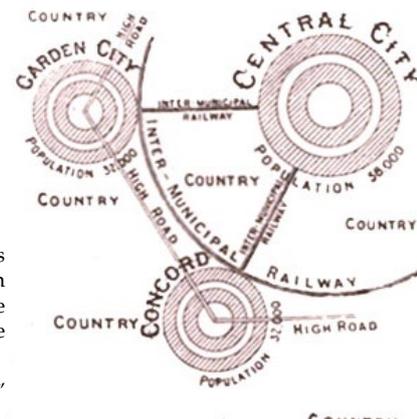
Fig. 2- 12 Diagram of Ebenezer Howard's Garden City concept from 1902 based on combining town and country to provide an alternative of reisdence outside the crowded central cities
(source: Wikimedia.org, original: Howrad 1902, Garden Cities of Tomorrow, 9 March 2008)

areas.

Traffic safety in residential areas started to be of concern when it was proven that younger children were too vulnerable to cope with motorized traffic. Finding ways to allow them to play safely in the street was the first issue that led to considering speed reduction measures. It has been assumed that if through traffic was kept away from the neighborhood, allowing only resident cars to use the streets, then low speeds would be easier to attain.

Radburn (and Houten)

This first American garden suburb also came about in response to the growing use of the automobile and the desire to create an attractive living environment away from the congestion of the inner city. And although Radburn shared many design features with earlier English garden cities like the introduction of superblocks (between 9.2 and 20ha) it was in the settlement of Radburn, New Jersey in 1928 that a rigid segregation between traffic systems and pedestrian networks was attempted for the first time. Accordingly, houses were grouped around local residential cul-de-sacs (serving 10-14 dwellings) whereas pedestrian lanes ran separately at the rear of the houses (see figure 2- 13); this system necessitated complementary classes of street hierarchies; collectors for moving around within the community and highways to connect to the city. On-street parking was provided; houses were oriented away from the street and turned inwardly, placing the kitchen and living room to face the inner park.

This new model of circulation retained the key ideas of the rural setting and foot accessibility, but people walked on landscaped footpaths, while streets (with no curbs) were given over entirely to the automobile. Despite Radburn's drawbacks, the notion of pure residential streets limited to local traffic and the segregation of vehicles from people provided a new basis for residential planning and a new prototype for neighborhood layout that has persisted as a persuasive model for town planners to this day,
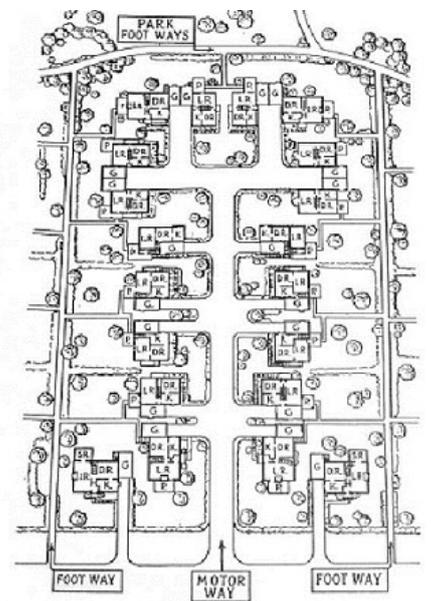
Fig. 2- 13 The segregation of pedestrians and cars in Radburn: pedestrians have their own paths lead from the backyard and through the park, whereas cars access the houses frontally (source: Southworth & Ben-Joseph 1997, p.65)
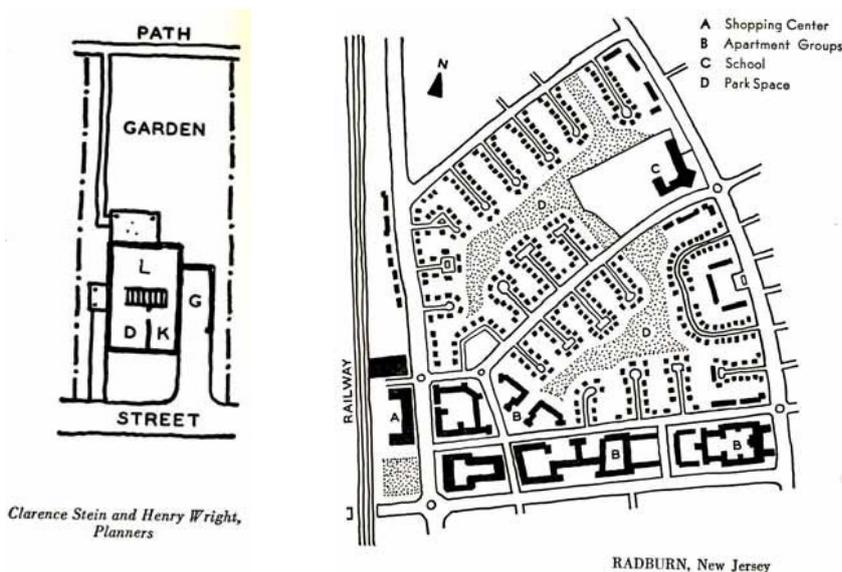
Fig. 2- 14 The Radburn plan of 1928 by Clarence Stein and Henry Wright which introduced the principle of large urban blocks to modern planning practice to help keep through traffic away. (source: Gallion AB & Eisner S, The Urban Pattern, New York 1963, p. 128)

especially for new suburbs. Regrettably though, later adaptations such as the introduction of looped streets, the elimination of the footpaths and parkland, increased development efficiencies while reducing the overall attractiveness of the original model.

A contemporary example in which the concept of segregation has been applied with great success is Houten, a recent new town for 35,000 inhabitants, just south of Utrecht in the Netherlands. This satellite city that was merely a small village of 4000 people in the 1970s has emphasized from its first urban planning schemes its wish to retain its rural character. In 1985, the town was enlarged by building 8000 housing units (row-houses) and from that moment on it has strived to become a residential area that is safe, quiet and environmentally-friendly.

Here the leading principle is the exclusion of most car traffic from the town center and giving priority to biking and walking. Encircling the town are two ring roads, one around the northern train station (Houten Station), the other around the southern train station (Castelluna) and these two stations are passed by the railroad running through the city center. Residential neighborhoods are connected to the ring road (Rondweg) by means of a forceps that enters every neighborhood which in turn connects the residential clusters with the trans-regional traffic network. The ring roads encompass an area of 1.4 million m² and a bike network spans a total of 129 km. When cars move from one area to another in the city they can only reach their destination by coming as far as the ring roads, this is done purposefully as to encourage the use of bicycles within the city itself, making riding the easiest and fastest mode of transport.

The center and the train station are connected to the ring road mainly by three routes and many more connections for delivery vehicles and public transport have been created to irrigate the center.

Fig. 2- 15 A schematic plan of Houten showing bicycle paths (in purple), car traffic (in yellow) and the ring road (brown)
(source: redrawn from a map provided by the Municipality of Houten)

The problem of intersections between the bike paths and the ring roads have been solved by two-layer intersections. Also three industrial zones (with non-polluting industries, e.g. commerce, fashion and information techniques) were intentionally placed outside the ring road (to protect residents from additional through traffic).

The Neighborhood Unit
During the same time as Radburn's development, Clarence Perry presented his concept of the neighborhood unit with the aim to sustain community life in residential developments. This neighborhood was to be regarded both as a unit of a larger whole and as a distinct entity in itself, its size was to be enough to house a residential community that requires one elementary school, it was to have all necessary facilities for the functioning of a residential community like small parks and playgrounds, local shops and a residential environment. Although partially self sufficient, its residents worked mostly outside. The neighborhood was to be surrounded by arterials wide enough to carry all through traffic. School and other institutions were to be grouped around a central point whereas shops were advised to be located at the neighborhood's circumference; preferably at traffic junctions so they are close to adjacent districts with similar neighborhoods. The concept segregated cars from pedestrians and advised to form the internal streets system in a way to discourage through traffic [Perry 1929].

2.1.5 The New Streets of the Modernists
In the 1920s there came visionaries that yearned for modern cities made for "speed and commercial success". They aspired to transform and make cities in the industrial world more efficient, rational and hygienic, opting for preconceived plans with extensive thoroughfare networks for efficient and unobstructed traffic flows. They set up the idea of clearly separating pedestrians from cars. Architects and planners like Gropius, Hilberseimer and Le Corbusier in Europe considered historic structures to be unsuitable for modern technical and hygienic requirements, the latter even ridiculing the morphology of spontaneous cities as being the product of donkey paths. Modernists did not associate themselves with garden cities either, for they believed them to be an escape from the real problem which is solving the traffic issue in the inner city. They argued for cities with big arterial roads, isolated land uses, a collection of freestanding towers
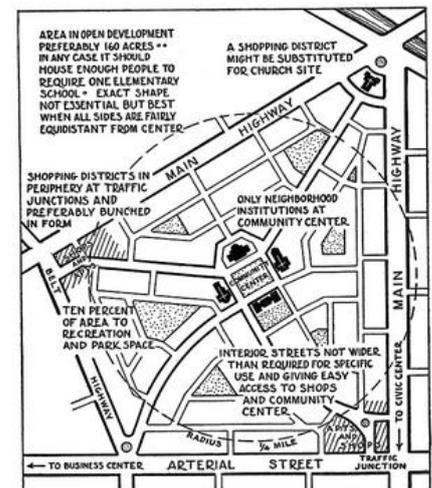
Fig. 2- 16 The principles of the neighborhood unit as described by Clarence A. Perry in 1929 (source: Southworth & Ben-Joseph 1997, p.69)
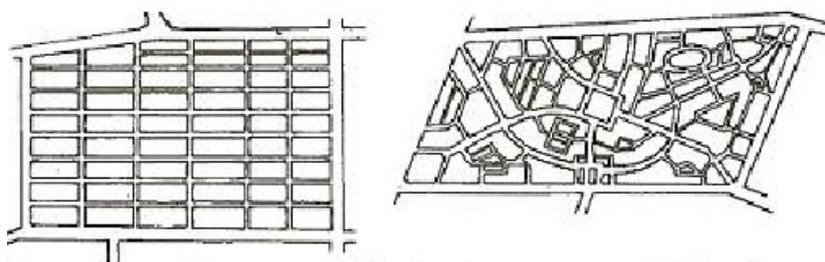
Fig. 2- 17 (a) & (b) In the neighborhood unit streets and pathways were to be designed where people wanted to go (b), in contrast to the conventional street grid layout that led nowhere in particular (a)
(source: Southworth & Ben-Joseph 1997, p.69)
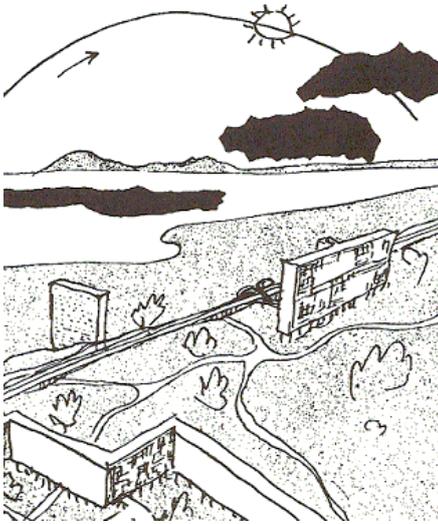
Fig. 2- 18 (above)Le Corbusier's functionalist vision of the 20th century city with purified vertical architectural forms and flowing land-scaped spaces in-between
(source: Trancik R, Finding Lost Space, Theories of Urban Design, New York 1986, pp. 22-23)
Fig. 2- 19 (above right) Hochhausstadt, north-south street, 1924. Ludwig Karl Hilberseimer, designer.
(vertical separation of functions, cars from pe-destrians and no green spaces)
(original source: Karl Hilberseimer Papers, Ryerson and Burnham Archives, The Art Institute of Chicago. Digital File #070383. HochhNord_1 © The Art Inst-itute of Chicago)

Fig. 2- 20 (a) The traditional relation between the streets and buildings (b) The modernist sep-aration between street elements)
(source: Marshall 2005, p. 6)

surrounded always by a sea of green. They opted for a vertical (multi-leveled) segregation between subways, pedestrians and automobiles, as well as between supply and disposal services, or as in the case of Le Corbusier's "ville contemporaine", for a horizontal segregation where pedestrians walk in vast parks completely separated from the vehicles that use the highways. Curves in their eyes were only allowed in the pedestrian foot-paths amidst green planes.

The core principles of the modernist movement have been put down in the Athen's charter, which served as a blueprint mainly for rebuilding European cities in the aftermath of WWII when motorization started growing very fast, and later was adopted by communist countries, eventually finding its way, as previous-ly mentioned, into developing countries including Arabic ones, that were seeking to industrialize after achieving independence.

When analyzing the Athen's Charter and when looking at mod-ernist developments, it becomes clear that the modern move-ment led to the ignorance and denial of the importance of street space, urban public squares and other important outdoor rooms leading to a deconstruction and separation of the elements of the street [Marshall 2005]. Modern designers and builders aban-doned principles of urbanism and the human dimension of out-door space established in the urban design of cities of the past. Thus enclosure, density, differentiation between public and pri-vate spaces (concepts so intrinsic to traditional urbanism, espe-cially Muslim) were abandoned; regionalism and environmental identity were ignored, and the prevailing attitude was to start from a "clean slate" [Trancik 1986].

At the beginning, and in the context of economic growth, adapt-ing roads and policies to the increasing traffic was seen as "pro-gressive", roads and their management became the domain of traffic engineers whereas architects busied themselves in design-ing architectural edifices. Since then, traffic engineers have tried to cure traffic congestion with more capacity by applying: wider lanes, more lanes, wider turns, overpasses, flyovers and under-passes. Accordingly roads were built or widened to accommo-date the growing car traffic often at the expense of other vulner-able road users and residents of built-up areas; pavements were
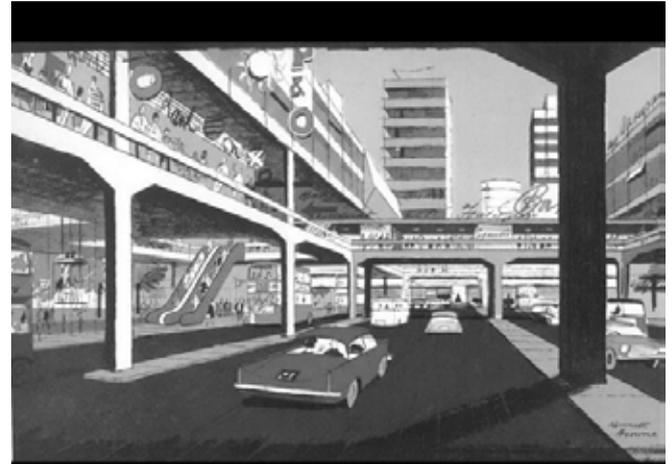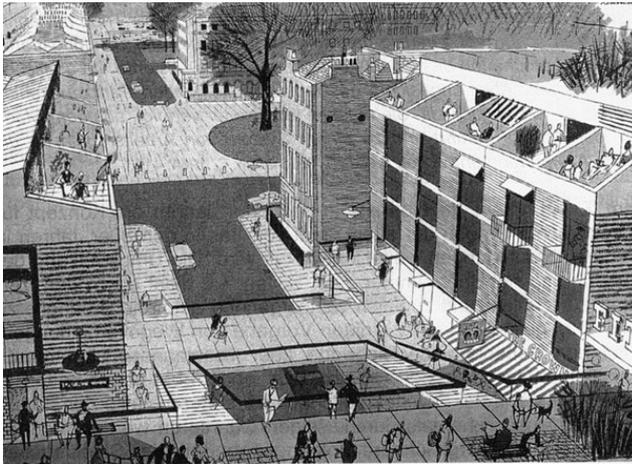
narrowed to put in additional car lanes, parked vehicles increasingly took over the space previously devoted to pedestrians and cyclists, and large urban arterial roads secluded parts of urban areas or cut through historic neighborhoods, all leading to a conflict of interests.

Best examples are American downtowns where high rise towers float among parking lots and roadways, encircled by a ring of lost space in the form of a highway that segregates the downtown from the residential neighborhoods. Pruitt Igoe was the most notorious example, designed in classic Corbusier, high-rise hives of steel, glass and concrete separated by open spaces of green lawn. On each floor of Pruitt-Igoe's 14 story blocks were covered walkways, in keeping with Le Corbusier's idea of streets in the air.

The Concept of Segregation Between Road Users

The concept of separating road users was reinforced throughout modernism which saw that total segregation is the only acceptable basis for urban form except in very-low speed car port or service lanes with direct access to doors.

Horizontal and vertical separation have both been practiced, in most cases pedestrians had to vanish from the street surface, a solution common in the sixties and seventies in the design of main roads and busy intersections and channel pedestrians underground. The separation concept has persisted until today even a few examples of an inverse separation exist, most notably in "Louvain la Neuve" in Belgium, where a whole new campus city for around 25000 inhabitants (with 5000 jobs and mixed land uses) has been created with a completely car-free inner city modeled on traditional towns with a dense network of narrow alleyways and tiny squares, but with distributor main streets and parking lots totally located underground. Another example is "La Defense" business district in Paris, such instances proved too costly to become widespread and they contribute little to the reduction in car-usage as they normally provide maximum comfort and an optimal infrastructure for the automobile.

2.2 THE RISE OF MODERN TRAFFIC CALMING

2.2.1 Buchanan's Environmental Areas

One of the first persons to publicly warn against the environmental dangers of private car-based mobility and who pointed out that most households will own cars and that traditional city form would not be able to cope with this impact was Colin Buchanan in the U.K. In his report Traffic In Towns drawn up for the British ministry of transport in 1963, he warned:

" *The briefest acquaintance with the conditions that now prevail in towns makes it clear that traffic congestion has already placed in jeopardy the well being of many of the inhabitants and the efficiency of many of the activities. Unless something is done about the potential increase in the number of vehicles that come together in neighborhoods the conditions are bound to become extremely serious within a comparatively short period of time. Either the utility of vehicles in towns will decline rapidly, or the pleasantness and safety of the surroundings will deteriorate catastrophically---in all probability both will happen together*"

He believed that urban areas should be reconceptualized for the motor era in a way to accommodate this increasing traffic volume, arguing that the two principle purposes of streets, movement and social interaction, need to be strictly segregated from each other, for this to take place it was necessary in his opinion to distinguish between two main types of streets namely the distributors serving the first purpose (easement of traffic flow), and access roads that connect to buildings and serve social purposes. He suggested creating "environmental areas", areas where environmental considerations took the upper hand over the use of motor vehicles, and from which extraneous traffic was banned. With time, Buchanan's considered solutions were found to be short-sighted: in practice his "environmental areas" became islands of calm amidst fast moving traffic in the adjacent areas (often residential) where the excesses were shifted. Equally regrettable was the amount of traffic infrastructure in form of large ring roads, bypasses, multi-level pedestrian decks and motorways that accompanied his vision, eventually leading to more automobile dependence. Nevertheless, he is considered to be the father of modern traffic calming by many Europeans as his tract explicitly argued for improving the environmental quality of urban areas.

2.2.2 Establishing Street Hierarchy (a functional categorization)

Among the legacies passed to us from Buchanan's report is road hierarchy, an influential force and an organizational "code" that that has since shaped the world's modern layouts over the past fifty years.

It is an urban design concept aiming at establishing the roles of different streets in a street system. Its usefulness is derived not

Primary distributors
District distributors
Local distributors
Environmental area boundaries

Fig. 2- 22 Buchanan's environmental areas (within the green boundary), from which extraneous traffic is banned and his devised hierarchy of traffic distributors.
(source: Great Britain Ministry of Transport, Traffic in Towns - A Study of the Long Term Problems of Traffic in Urban Areas, London 1963, p. 44)

only from its concern for efficient traffic flows, but also for road safety as it helps to avoid conflict by separating different roads serving different purposes from each other and other buildings. Furthermore, creating a hierarchy helps in taking decisions about the design and management of a road or street along its length as well as in assisting with the allocation of responsibilities for the upkeep of roads.

The conventional road hierarchy (Buchanan's hierarchy) has often been viewed with contempt, especially by urban designers that claimed it produced dull and dysfunctional roads lacking in urbanity and sense of place. In recent history though, mainly through research by Stephen Marshall, it has been demonstrated that the rigidity of conventional hierarchy comes about through its fixing of street types according to an idealized spectrum in which the "mobility function" lies inversely to the "access function". In practice this entailed that roads with pedestrian access tended to be limited to access roads at the bottom of the hierarchy, separated from the distributor roads intended for use by buses. This resulted in a disjointed system where oases of urbanity (constituted by pedestrian-friendly local streets) were lost in a desert of car-oriented distributor roads. This meant that in such a hierarchy there was no place for streets in which mobility function is coincident with access function (i.e. traditional European arterials or boulevards), so the resulting palette of street types was very humble. By applying conventional hierarchy, possibilities for multifunctional streets like a tram-served-arterial-connector-boulevard or the slow-speed-shared surface-*woonerf* are foreclosed.

In order to "fix" this drawback in Buchanan's hierarchy, Marshall has called for decoupling the conventional fixed relationship between mobility function and access function to allow street types to have any combination of both independent variables. He renamed the altered hierarchy "classification" as it identifies the functional role of individual streets or sections of streets with respect to the whole system as it could guide decisions on tradeoffs between different users of street space. This classification is mainly based on two ideas, first that any street section has a combination of a link status and a place status which are independent variables and not in total opposition to each other, second that what determines the link or place status is not only the immediate attributes of the street section (including physical form and demanded use), but also the role they perform in the wider urban system [Marshall 2005].

2.2.3 The Birth of "Streets for People"

Through the sixties, the deficits of the automobile were more and more obvious; urban quality and public spaces gained momentum in public debates and the sharpest criticisms of modern cities belonged to Jane Jacobs. In her book "The Death and Life of Great American Cities" from 1961, she reproached urban designers for missing pedestrians and the essence of effective public space out.

The major reproaches against auto-mobility were:
 - Open-space deficits
 - Loss of public life
 - Social disintegration
 - Endangering traffic safety
 - Noise and pollution by exhaust emissions
 - Loss in the design quality

As a result, and with help of another publication by Bernard Rudofsky in 1969, the notion "Streets for People" was born. Accordingly, interest in improving streets for the pedestrian increased. Although the first pedestrian streets were founded in the period between WWI and WWII in city centers, from 1971 onwards it has become a vital urban planning instrument of modern city planning that has been adopted across large and small European cities:

2.2.4 Pedestrian Shopping Streets
The horizontal separation between pedestrians and cars in commercial streets took a more dramatic appearance when cars were totally banned from the whole street or from some sections of a street. Only access for delivery cars was allowed but limited to certain times during the day. Usually public transport lines were also removed, only rarely a tram line was allowed to traverse a pedestrian street to insure the inflow of shoppers. The same applied to cyclists who were not allowed in the pedestrian street. The first pedestrian shopping street in Europe opened in Rotterdam in 1953: the Lijnbaan shopping street.
Initially there have been two major motors behind pedestrianizing streets:

- **Achieve environmental improvement and pedestrian safety through traffic management**: this was especially true in European old city centers composed in large from many narrow, winding picturesque streets, where increases in automobiles clogged the streets and endangered pedestrians. Instances of this are Swedish city centers

- **Commercial development:** in German and American cities the economic boom in the aftermath of WWII made the business community concerned about the economic vitality reflected in sales rates in commercial cores. Thus the ease of shopping had to be guaranteed and made attractive, and it was usually a few linear blocks along the traditional main shopping street that were pedestrianized

Creation of a pedestrian street initially entailed construction of many parking lots, ring-roads and underpasses to ensure maximum accessibility by car for potential customers, also in some cases new back streets were established at the rear of the pedestrian street to supply shops with goods, even some historic building stock was demolished for this purpose. These streets had usually a poor design quality which contrasted largely with the

Fig. 2- 23 Lijnbaan in Rotterdam in 2008, the 1st pedestrian shopping street in Europe, nominated as a national monument)
(source: courtesy of wikifrits, www.wikimedia.org, 6 February 2008)

new pedestrian street.

The concept of "single" isolated pedestrian streets persisted throughout the sixties and seventies, and it is worth-mentioning that beyond those "pedestrian islands", European medieval centers during this time were overwhelmed by cars that filled their streets and squares. This contributed in many cases to pushing many people dreaming of their own "house with a garden" to the suburbs, retail and workplaces followed suit and relocated to greenfield sites where large shopping malls were erected and sucked the city's purchasing power leading to the depreciation of the traditional centers.

2.2.5 The *Woonerf* & *Winkelerf* Models
The *Woonerf*

Known by the names: *Woonerven*, home zones, *Wohnstraßen* (living streets) & *Verkehrsberuhigte Bereiche* (traffic-calmed areas)

At the end of the sixties, a new prototype for a traffic-calmed street was developed in Holland: the "living yard" or the "play yard" (*Spielstraße*). It is the first concept to integrate mixed traffic in the same space and to address existing built-up residential areas. Street space is shared by pedestrians and cars alike; the pedestrian has the right to use the whole width of the street and in fact enjoys precedence, so raised sidewalks are unnecessary, cars move at a walking pace, at junctions all traffic on the right, including pedestrians, has priority.

The concept was born by a pioneer grassroots movement formed from angry Delft city residents that couldn't tolerate through traffic that cut across their neighborhoods and endangered them and their children. They took action by turning their streets into *woonerven*, literally "living yards", extending their living rooms to the street by paving the whole width of the street in uniform stone, placing obstacles for cars and deviating their track by fitting the street out with tables, benches, sandboxes, plants and parking bays, the main objective being to limit the view axis of the street and thus reducing car speeds [Schepel 2005]. Although it was clear that the concept led indeed to a substantial reduction in the number of injury accidents, not only in the *woonerf* areas but also in the surrounding traffic areas, reduced speeds and a marked improvement in the urban and environmental quality especially in crowded areas, experiences made with the *woonerf* concept have been diverse across Europe, and have not found equal implementation in all countries; major criticism against the conventional "*Wohnstraße*" has been the high costs that its implementation entails especially "the leveling" of the street surface in existing built- up areas as well as the risk that it could lose its raison d'être, once the young children of that street grow older and leave the area. From this perspective, a more flexible design is needed that could easily adapt to changed conditions. Another criticism concerns the many physical alterations that are necessary to effect speed reductions which are feared to take up the

Fig. 2- 24 Treppenstrasse in Kassel in early June 2008, the first pedestrian zone in Germany created in the 1950s, the photo was taken early June, 2008
(source: courtesy of Swen Schneider)

Fig. 2- 25 A demonstration Woonerf in Rijswijk, Holland
(source: Hamilton-Baillie 2001, p. 14)

Fig. 2- 26 A homezone in Europe
(source: Passmore D 2004, no title, n.d. via Flickr, Creative Commons Attribution)

Fig. 2- 27 A traffic-calmed area in Tübingen, Germany 2011

much needed and scarce space for other social uses [Wälti 1998], the "zigzag" nature of the design on the other hand is nowadays unpopular (clearer and more readable layouts are preferred that don't affect the linearity of the street space). Nevertheless, the concept has become an established component in broader urban policies in Denmark, Sweden, Holland and Germany and recently in England.

In Germany the equivalent of the *woonerf* concept is the traffic-calmed area which is mainly devised for individual streets or areas with little traffic volumes with an emphasis on "social and staying activities". In addition, this concept led to the development of the "Tempo 30 Zone". In Switzerland, it developed into the concept of "*Wohnstraß*e", where maximum speeds cannot exceed 20km/h and later developed into an enhanced type of Wohnstraße, namely the "Encounter Zone" (as will be discussed later). Especially in the Netherlands, where the *woonerf* concept has been successfully applied to more than 7000 streets and residential areas, it remains popular today, and although it is now taken for granted, and despite the fact that the common blue signs indicating a *woonerf* zone have been removed from many zones, traffic still rarely appears to move faster than 30 km/h and this design approach has remained the optimal choice for residential streets [Hamilton-Baillie 2001]. Hamilton-Baillie who examined "home zones" in four different European countries, has noticed that all the observed streets shared similar characteristics: the lack of separate raised pavements, a variety of surface treatments suited to a pedestrian environment, the use of trees, planting and street furniture to define and screen car parking, the use of bollards and street lighting to define space, and the use of simple "gateways" at the entry points. Yet he concluded that the striking quality of all the *woonerf* streets is their individuality. There is no common template; every street is treated differently.

The *Winkelerf*
Winkelerven: Traffic-Calmed Commercial Areas
In central city areas with high pedestrian volumes and spaces with "staying" quality potential, commercial areas could be converted to zones with speed limits reaching below 30km/h. (even 20km/h if necessary) In contrast to *Woonerven*, pedestrians in the *Winkelerven* do not enjoy precedence, but through traffic calming and streets' redesign more space gets reallocated for pedestrians and therefore the portion of the road's right-of-way devoted to walking, cycling increases and more room for movement and pedestrian activities is available if compared to "Tempo 30 zones". Usually, in order for the Traffic-calmed Commercial Zone to perform efficiently, a limitation of parking areas accompanies the measure, special loading spaces are provided and traffic flows are maintained below 300 cars per hour.

2.2.6 Area-Wide Traffic Calming & Tempo 30 Zones
In the late 1970s, Germany experimented with traffic reduction

measures on a neighborhood level and it was in this era that the term "traffic calming" was coined, translated from the German "Verkehrsberuhigung". Germans quickly realized that calming individual streets or spots resulted in traffic diversion to neighboring streets; already quiet streets became quieter whereas traffic shifted to adjacent areas, so they decided to extend their principles to include wider areas (surrounding streets including main streets). In addition to the traffic-calmed zones, Tempo 30 zones gained in importance:

Tempo 30 Zones
These zones were originally developed in Germany in the 1980s when it became increasingly evident that calming wider areas by using intensive design measures would be too expensive, thus 30km/h zones were devised as a more cost-effective means to calm extensive areas. The measure is also known under the name "Buxtehude Model" in reference to Buxtehude, where this concept was tested for the first time. Limiting speeds to 30km/h has proven to reduce the number of accidents involving serious injuries significantly (60-70% less than before) whereas accidents involving deaths are reduced by 90%. Furthermore, the environmental quality of quarters is improved and the lower speeds do not cause substantial delays for vehicle drivers because with the reduced speeds, the pace of traffic flow actually steadies.

This measure has been introduced to clearly defined zones with a uniform character and appearance like a residential quarter, the size of which ranges between 0.4 km²-0.7km²: In these zones, the right hand right-of-way applies at intersections. Specially developed signs placed at the entrances to the area indicate to the driver he is entering a calmed zone where he needs to slow down, sometimes the narrowing of the carriageway at the entrances of the zone is carried out and localized measures are applied such as cobbled surfaces at crossing points and narrowings. Different street users have separate spaces allocated to them in the street space (cars use the driveway, the pedestrians use the sidewalks). Parking is only allowed within marked areas. Pedestrians do not enjoy priority, but due to reduced speeds it becomes safe for them to cross anywhere, so marked pedestrian crossings are usu-

ally removed, only in exceptional cases, like in front of schools, they are installed:

Despite gaining much popularity for being the easiest and cheapest existing measure to calm traffic over extensive zones, experience has shown that signage alone isn't enough to ensure that drivers slow down. Accompanying measures in form of physical changes to the street space or surface design and other traffic regulating measures were found of utmost importance to enforce change in people's driving behavior and speed reduction. Thus a standard repertoire of traffic calming measures was developed to complement the Tempo 30 Zone (refer to section 2.2.7). Narrowings (gateways) at entries to the zone were installed to highlight the transition from the transport-oriented road network to the traffic-calmed area, streets were narrowed in some sections, and bike paths were constructed.

Today, it continues to be widely applied due to its easy and economical implementation and the rules for its establishment have been further relaxed, for instance the limitation on the zone's size was given up in Germany in 2001, as the essence is not to include any streets belonging to the major road network especially serving public transportation lines or commercial transport (main streets and important collectors), but exceptions also exist and streets with public-intensive facilities could have Tempo 30 implemented but restricted to short stretches which would help link the different traffic-calmed quarters together.

2.2.7 Traffic Calming on Main Roads

In the early 1980s it was noticed that most accidents take place not on access streets but on collector streets or arterial streets that carry some through traffic and cut through towns or residential areas. Since building bypasses proved futile and much more expensive, traffic calming on through roads and other busy streets has been initiated throughout Europe and its importance has grown since the realization that such initiatives were vital if home zones were not to remain ghettos within barriers dominated by traffic. Thus the "boulevard" has experienced its new golden age at the turn of the 21st century.

Overloaded arteries where cars dominate the scenery are being transformed from single-purpose traffic conduits, into complex

Fig. 2- 30 (below) A through road in Bern, Germany redesigned to ease crossing for pedestrians
(source: photo courtesy of Dr. Wolfgang Haller)

Fig. 2- 31 (below right) Proposal for redeveloping the city ring in Cologne to make enough place for pedestrians and cyclists. Different stretches of the six-kilometer-long ring will have appropriate design
(source: courtesy of Pesch Partner Architekten)

urban spaces and are being fitted with armature of the public realm. In most cases roads are simply reduced from six to four traffic lanes or from four to two lanes and transformed into a series of streetscapes, with footpaths containing trees or outdoor cafes and differentiated non-bituminous paving. These techniques are meant to make them safe and attractive for all categories of users [Hebbert 2005].

Historically, the boulevard has been a mixed-use public way serving a variety of functions: the movement of traffic, provision of green space in the city, relief of congested and overcrowded areas. Now the reduction in lanes is at times being benefited from in setting up transit such as new rail links. Common practice is also the use of roundabouts to replace junctions with traffic lights, the use of raised junctions and chicanes, and parallel parking on both sides is often replaced with angled parking on alternate sides of the street. The results were mostly a drop in vehicle speeds, decline in accidents, air quality improvement, and the cost of employing the traffic calming measures was about one-third to one-fourth that of constructing a bypass.

The practice has acquired various names, like "Environmentally adapted through roads in Denmark", elsewhere this practice is called "Urban boulevards" [Kenworthy & Newman 1999]. Even the multi-way boulevards belong to this group, which in addition to being high-capacity thoroughfares and linear parks; provide an efficient access system for local streets giving access to abutting land-uses. So in addition to accommodating pedestrians, cyclers and transit on dedicated lanes, they also cater to two different speeds of vehicular traffic [Dunham & Williamson 2009]. Good examples of a central boulevard and a multi-way boulevard are *Las Ramblas* in Barcelona and the *Champs-Élysées* in Paris respectively.

What is the decisive factor when choosing a certain type of calming measure is primarily the function that the street performs; whether it is a space where one strolls and maybe plays or socializes — a so-called "experience fostering space" or it serves a pure traffic function, as a mere linkage between points A and B?.

Fig. 2- 32 (left) and 2- 33 (above) An elevated four-lane expressway (Cheonggye) in Seoul, once a symbol of modernization and industrialization, that was established in 1971 above a conventional roadway covering a stream, was redeveloped in 2005, when the area became noisy and crowded, into an urban parkway after restoring the river and establishing a Bus Rapid Transit line that carry the original 150,000 drivers that used the freeway in the past

((left): owner: Seoul Metropolitan Government, source: www.preserve.net, 05 December 2011, (right): Sotnikov M, Hi Seoul' 2008. Spring. 2nd day, 5 May 2008 via Flickr upload bot, by Isageum, photo by Michael Sotnikov licensed under Creative Commons Share-Alike Attribution 2.0 Generic, http://commons.wikimedia.org/wiki/File:Korea-Seoul-Cheonggyecheon-2008-01.jpg)

Fig. 2- 34 Choker combined with a speed bump.
(source: Bundestadt Bonn 1992, Für Bonn Tempo 30: Beiträge zur Stadtentwicklung, Stadtplanung und zum Bauwesen, Bonn, p.14)

Fig. 2- 35 Speed cushions allow the integration of buses in Tempo 30 zones.
(source: Bundestadt Bonn 1992, Für Bonn Tempo 30: Beiträge zur Stadtentwicklung, Stadtplanung und zum Bauwesen, Bonn, p. 25)

Fig. 2- 36 A raised cross-walk combined with a pedestrian refuge.
(source: Bundestadt Bonn 1992, *Für Bonn Tempo 30- Beiträge zur Stadtentwicklung, Stadtplanung und zum Bauwesen*, p. 16)

2.2.8 Engineering Traffic Calming Measures with Localized Benefits:

At first, traffic calming measures prioritized resolving the traditional cross-section of the street leading in many cases to the dissolution of the traditional historic space's profile, afterwards it was realized that traffic calming should go hand in hand with urban street design. Restrictive physical measures although at times helpful; proved too localized and mainly aimed at hindering the car in some sort. The approach that has proven more effective and therefore recommended is using street design that emphasizes the qualities of the streets' environment, by showing its users the merits of its surroundings. A more urban oriented environmental design proved to be better, in which even a stranger or a passer-by will feel at home but will at the same time be tempted to respect its rules. One that prioritizes achieving a pleasant ambiance in the street, emphasizing "staying and lingering qualities" as well as display uniformity and identity.

Even if the function of city streets must extend beyond technical necessities as traffic conduits, still, the design must of course also respond to technical demands like stability, durability and reliable drainage, convenient accessibility for pedestrians as well as cyclists and motor vehicles. Technical, speed-restraining measures should be used rather sparingly. Accessibility for large vehicles should remain reasonably assured (minimum turning curves, clearance), but in tight historic towns, rules regarding turning ratios are usually more relaxed, whereas issues relating to urban design and preservation gain greater weight.

Nevertheless engineering measures are necessary helping instruments to achieve reduced (safer) speeds in built up areas, and in making residential areas less attractive to through-traffic. In the following the most important traffic calming techniques will be introduced:
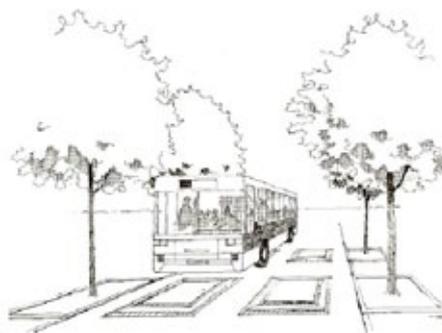
2.2.8.1 Modifications to the road width: (chokers)

Through this device, an increase in street safety for pedestrians can be expected especially at intersections and pedestrian crossings. This device is set up in streets with high speeds in order to induce drivers to slow down. They aren´t suitable for lower-speed traffic areas (i.e. residential areas) as the effects won't be as obvious. They help establish a "gate effect" which helps distinguish independent units (e.g. entry to residential neighborhoods, towns and villages etc).

This device is also used in combination with other traffic calming techniques like speed humps and traffic islands, sometimes the narrowing can be found only on one side of the street.

2.2.8.2 Modifications to the road surface

Changing the road surface by applying raised areas, different materials, colours or textures is an important element of traffic calming. Such an alteration can be used to distinguish and delineate boundaries in the street space that have different functions (i.e. parking spaces from roadways (traffic lanes). It is also used

to convey signals (acoustic or visual) to motorists and inform them about a changed situation in order to induce their cautiousness. The most popular locations for this kind are: entries to traffic-calmed neighbourhoods, pedestrian crossings or at the start of a residential street.

Speed bumps, humps, cushions and speed tables:

The effect of bumps is limited to the point where they're installed. Drivers are forced to brake and considerably reduce their speeds when reaching that point to avoid damage (to themselves and car). They cannot be used in well-traveled streets or in streets with public transportation because of the noise and air pollution generated by them, since often times drivers brake at them but then speed up again. It is important to highlight them, make them seen and light them.

Humps are a milder version of a bump as they have a more gradual slope, speed cushions also extend the width of a street, but have intervals which line up with the wheelbase of utility vehicles such as refuse trucks, fire trucks, ambulances, and moving vans. This configuration allows large vehicles - and bicycles - to avoid the raised pavement entirely.

Traffic islands (pedestrian refuges)

These are typically used when a street is very wide as a safe harbor for pedestrians to cross busy streets. It could also be designed in places to prevent cars from making U-turns.

There appeared different kinds of such refuges:

- Short and narrow islands:

typically, the islands are not landscaped but will have decorative hardscape in the center. Narrow median islands are designed to prevent turning vehicles from crossing into opposing travel lanes when making turns onto or from the street.

The narrow median island also has a narrowing effect, which will slow traffic. It also provides refuge in the form of a safe waiting space in the middle of the street for pedestrians crossing wider and busy streets. It is advisable to concentrate such islands on only few spots.
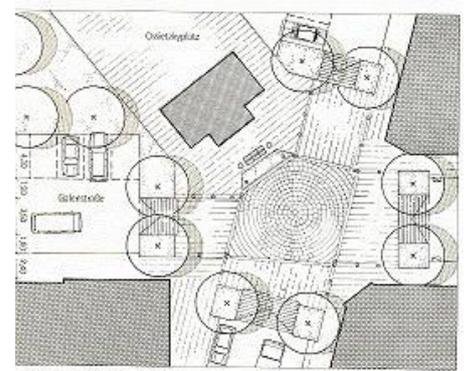
Fig. 2- 37 Redesign of an intersection and raising its paving to the level of the sidewalks not only effects speed reductions but also contributes to the improvement of the urban environement
(source: Stadt Witten n.d., p. 34)

Fig. 2- 38 (below) Kensington High Street, London with a center crossing island used for bicycle parking
(source: The Royal Borough of Kensington and Chelsea)
Fig. 2- 39 (below right) A raised junction combined with a small roundabout in Portland, Oregon
(source: courtesy of Hamilton-Baillie)
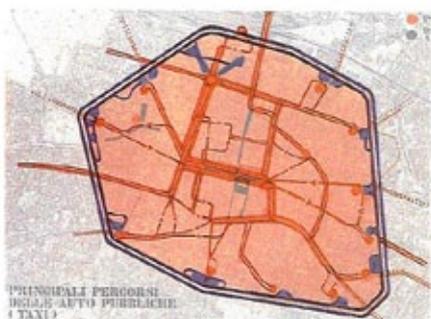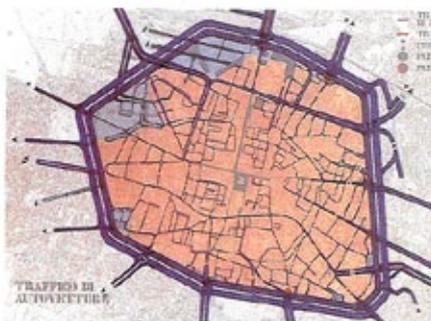
Fig. 2- 40 Traffic concept for the historic city of Bologna that was converted into a traffic limited zone in 1989 (from top to bottom: reorganization of the bus network with quantity distribution that is partially served by mini-buses (a), pedestrian flows density distribution (b), access networks for residens and supply traffic (c), Taxi stands locations and short-term parking at city gates(d))
(source: Winkler B, Stadtraum und Mobilität- Die Wiedergeburt des öffentlichen Raumes in Italiens historischen Städten, Stuttgart 1998, p.202)

- Traversable islands (around 2.5m):
such islands offer crossing possibilities all along their length, they are useful in shopping streets where many crossings take place. Cars can also traverse them in order to park on the other side of the street or to access areas. At some intervals they should be planted with trees so that cars don't mistake them for a traffic lane and use them to overtake other cars. If an accident occurs, the islands help keep the traffic flowing, and impede traffic jams. It is advisable to avoid small bushes or plants that could obstruct the view especially for children's safety. Traffic islands designed to help pedestrians cross the street should be ≥ 2m wide, if planted ≥ 3m.

Traffic islands are also used in combination with other devices, like with speed humps. In places where a further decrease in speeds is desirable (i.e. streets leading to schools) an additional speed bump (raised 8-10 cm above street level) or a change in the surface material could help. Minimal width for the island: 2.5m (for people with baby strollers or with bikes). Planting trees on the island not only boosts drivers' attention but also adds to the street's greenery, the hump is at times only on one side, in case a bus line uses the route.

Raised intersections (plateaus) and textured junctions:
Alterations to intersections serve not only traffic safety but also have a positive impact on city design. To increase drivers' attention at intersections, they should be raised to reach the same level as the sidewalk (to place pedestrians and cars on the same plane and thus enhance their access. This device can be installed in residential or minor collector streets and at intersections with substantial pedestrian activity but shouldn't be installed in higher-volume streets.

Small roundabouts
Roundabouts force drivers to yield at intersections as they require vehicles to circulate counter clockwise around a center island, therefore they help obtain lower speeds, and fluidize the traffic flow and so their benefits are primarily limited to motorists.

2.2.8.3 Informative measures:
These serve to alert road users of the behavior expected from them upon entering a certain street or zone, most common are the maximum speed signs.

2.3 THE ASCENSION OF TRAFFIC CONCEPTS CURBING CAR USAGE

It has been later argued that despite area-wide traffic calming, heavy traffic shifts and ends up anyhow somewhere in cities, so the new city-wide policies that followed especially in the late 90s have called for the restraint of car use:

2.3.1 Car-free City Centers

Varying names have been given for the same concept in different countries but also in different cities of the same country: car-free city centers (in Germany) or *Zona a Traffico Limitato* ZTL (car limited zone) in Italy, *Fußgängerfreundliche Innenstadt* (pedestrian-friendly city center as used in Aachen, Germany)

In contrast to single pedestrian streets or zones, the banning of cars from the city center has entailed relieving extensive and wider inner-city areas from unnecessary motorized traffic (especially through-traffic) and from parked cars, and allowing only the most functionally necessary share (usually resident and hotel guest cars in addition to delivery and service vehicles).

Cities with former pedestrian zones now expanded the car-limited area ten to fifteen-fold, and unlike earlier schemes, concerns for heritage preservation and environmental protection gained the upper hand and hence extended pedestrian zones were created which embraced the streets surrounding the main commercial streets, and thus replaced the single isolated pedestrian street.

This concept that developed in the late 1980s, has become a fundamental tool used by city governments to rehabilitate inner cities and to increase their economic and cultural vitality. It has mostly been developed in conjunction with extensive measures to improve public transportation, and hand in hand with parking management systems in the old city and around its fringes.

Long-term parking inside the city center is discouraged by introducing parking meters along streets, whereas enough parking spaces outside the city center are accommodated and park & ride (P&R) facilities are usually introduced at the edge of the center with enough parking spaces for visitors (especially commuters who flock to the city to work and comprise a big percentage of the demand on long-term parking).

Historic centers in Europe underwent a series of threats, among them were increased motorization, the emergence of large housing estates and shopping centers at the periphery of cities in the fifties and mid sixties and the resulting outer migration from the city centers and conversions of apartments into offices. In the 1970s when the deficiencies of suburban hosuing estates were becoming more and more apparent, and when the limitations of growth had been understood, there occurred a reversal in thinking initiated also by citizens' movement: "the urban qualities of existing historic quarters were being rediscovered again, rejuvenating and transforming city centers into livable and habitable places took the upper hand. Streets were resurrected again for communication and leisure and were made attractive to lure people back to them under the slogan "city center revitalization" with emphasis on upgrading the residential environment of the actual residents, and as of the 1980s planners resorted to planning and locating shopping centers in the pedestrianized inner cities as well.
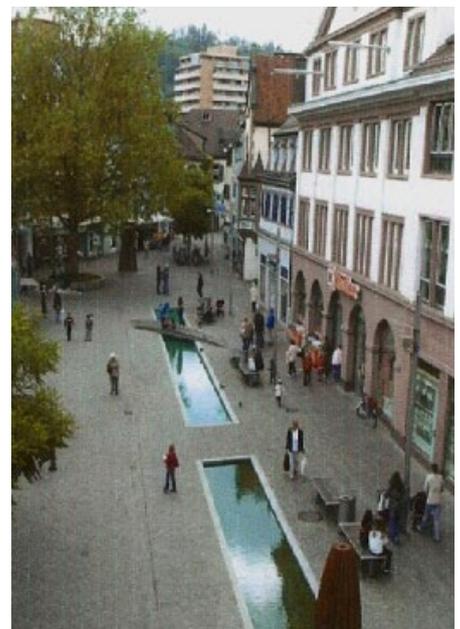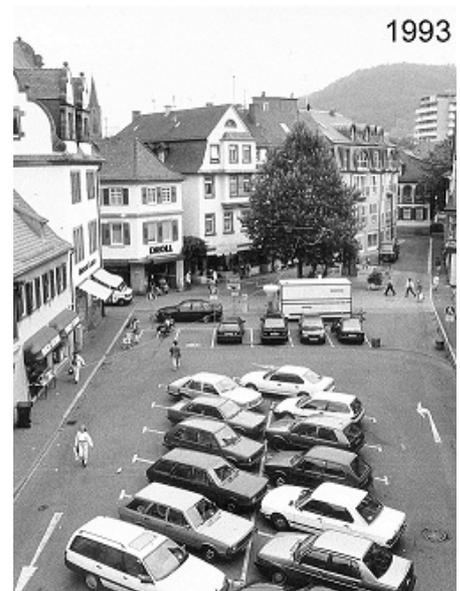
Fig. 2- 41 & 2- 42 The Schlossplatz town center in Lahr, Germany before its closure to traffic (a) and after redevelopment (b)
(sources: photo by Michael Bamberger (above) and courtesy of the city of Lahr (below))

Pedestrian zones became symbols of progress especially in Europe, but transferring this concept to suburbia hasn't been successful, it ended in mono-functional residential or shopping streets that looked shabby, lacking in the mix of uses found in historic city centers, not offering the quality space found in them [Frehn, Beilein &Tack 2008].

Today Car-free environments are seen as an appropriate strategy for urban areas that are seeking to position themselves as tourism destinations for they have proven to be supportive of tourism and leisure activities, this is evident in the fact that most car-free places, towns or cities are popular touristic destinations and have the world's highest residential property values, examples of this are Venice and Capri in Italy, Louvain la Neuve in Belgium [Wright 2005].

2.3.2 Parking Management

Parking management policies that determine the location, numbers, regulations and charges of the parking supply in urban areas are highly effective instruments for controlling accessibility and determining the volume and pattern of car traffic starting and ending in an urban area. Especially in the usually congested city centers, parking policies could contribute much to the reduction of traffic volumes, if parking facilities are located on the fringe. They are most successful if they are designed as part of an integrated concept, and should come hand in hand with park and ride as well as bike and ride facilities, as not all suburban areas are adequate to be serviced by public transport. Safe parking facilities and combined ticketing with public transport modes, car-sharing and bike hire etc are important support measures to restrict car-accessibility.

But limitation of car accessibility to city centers has usually raised concerns about the risk of revenue loss. Empirical research examining the effect of car-restrictive measures in inner cities on the sales' volume and structure of retail in several German cities (through conducting consumer census in these cities and their hinterland) has shown that these concerns are not justified. Although accessibility is considered important, it is other factors that determine the attractiveness of the inner city, such as the number and type of businesses and the inner city's overall ambiance. Also, contrary to common perception, the number of parking choices available in the city center is less decisive on the purchasing power retention than safe crossings' availability for pedestrians on main streets as well as availability of cheap public transportation and cheap parking [Baier et al. cited in Nielsen 2001].

Parked cars also dominate the image of the street to an extent that architecture seems at times invisible; one car parking space removed from the street (25- 30m²) can be allocated to different uses serving public life, i.e. a shelter for bus users or a bicycle
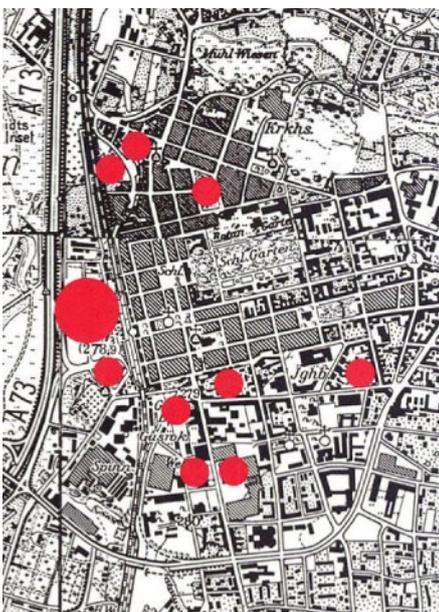
Fig. 2- 43 Distribution of parking facilities around the inner city of Erlangen, Germany (source: StMI 1990, p.15)

parking place for 15-20 bicycles, therefore any reduction in the number of cars in a street even the parked ones is highly appreciated.

Measures leading to a reduction of parking spaces and a more orderly arrangement of cars in the street include:

- Parking pricing
- Transfer of parking structures to the edge of cities or homogenous districts (environmental areas)
- Moving the cars to the driveway (not the edges)
- Arrangement of parked cars according to the space structure
- The necessity for interruptions in the continuous rows of parked cars to acquire space for other uses, i.e. tree bases and for crossing
- Introduction of parking bans or restrictions in certain streets, restricting car halting only to three minutes for boarding or exiting passengers (resident, visitors or customers), loading and unloading activities.
- Sometimes relocating parking spaces beyond the street, even if the alternative spaces are not located directly outside the house or shop, could still be accepted if: they are easy to find safe and attractive pedestrian connections are available

Parking Structures Serving Old City Centers:

The importance of motorized traffic for retail trade inside city centers is great. Yet past experience has shown that all efforts attempting to open the historic city center to traffic has proven counterproductive. Already a few parking spaces in a central location generate permanent parking search traffic. Any increase in vehicular travel impacts directly the people that are sojourning in the streets given the tight conditions [Pesch 2002].

Experience has proven that a long-term viable traffic concept for historic centers should entail the concentration of larger parking structures at the edges of the central area [Bayerisches StMI 1990]. Even if the principle of "parking at the historic city walls" in large city cores is difficult to fulfill, nevertheless it points to the right direction. Not the accessibility of each segment of the city center by car is to be strived for, but rather the establishment of easily accessible parking from which attractive footpaths connect to shops and public institutions [Pesch 2002].

Optimal locations for car parking facilities are strategic points near main access roads to the city center to minimize driving into and through central areas, this also demands that parking structures are consistently integrated with existing building structures and greenery [Bayerisches StMI 1990] [Pesch 2002]. Sometimes they could be connected together by a ring road. Today, although still found in many large European cities, ring roads have lost in popularity; they are seen as obstacles that hinder the inner city's further development. Nowadays through traffic is diverted to main arterials.

For larger parking structures on the other hand, favorable locations are next to major traffic nodes where the main train station and other transportation terminals like buses, trams and the

Fig. 2- 44 & 2-45 Parking structures connected
along the ring road of Ingolstadt, Germany
(source: Bayerisches StMI 1990, p.10)

Consistent planning in Ingolstadt, Germany has produced a model parking management system whereupon all larger parking structures are connected together through a ring road and linked to a parking guidance system, whereas short-duration parking spaces can be reached through side streets inside the historic center [Bayerisches StMI 1990].

metro meet, but also close to important buildings like hospitals and universities at the fringe of historic centers. If necessary, depending on the city size, these larger parking garages are supplemented by smaller parking lots or spaces within the city center itself and these should preferably be turned into private parking serving businesses. A parking guidance system is usually introduced to inform about the location and occupancy of parking garages, which helps the orientation of car drivers and avoidance of parking search traffic.

Discrete designs are preferable when designing parking structures in historic centers especially close to some important monuments or near the old city walls, so that they fit within their surrounding and do not stand out [Bayerisches StMI 1990].

Underground and multi-story garages are replacing on-street and above-ground parking and while underground parking is costly, it is therefore recommended in exceptional cases. Such measures make it possible to allocate the regained space for new street uses and the design of attractive public spaces. In some historic centers like Bologna, underground private parking has been constructed for residents on public grounds as well as on private land, but such attempts find limited implementation because of the scarcity of available space, social envy and the risks linked with archaeological finds.

In Copenhagen the gradual reduction in parking spaces over the years (3% less each year spread over almost 35 years), and the gradual pedestrianization in addition to augmented parking costs (app. 4 US dollars per hour) have gradually taught drivers not to go to the city center by car unless they really need to [Gemzøe 2001]. Especially historic cities that are densely populated and with a narrow street network are opting for reductions
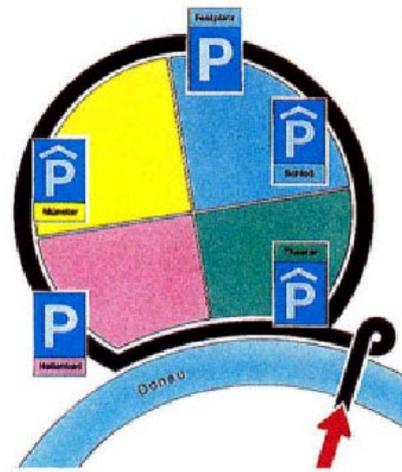
in the number of parking spaces within their boundaries and moving traffic and parked cars outside of their cores to reduce pressure on the urban fabric believing that more reduced traffic in the centers will bring about a healthier natural environment, more vitality and hence more economic investment.

2.3.3 Road / Parking Pricing and Other Economic Penalties

Experimenting with the concept of city centers with limited car access especially in Italian cities has proven that in order for the concept to function well and achieve meaningful reductions in cars entering the historic inner centers (and thus reducing congestion and emission levels) it cannot solely rely on traffic bans with entry exemptions for particular users since with poor enforcement and with too many exempted groups requiring complicated administrative procedures, the concept usually deteriorated; what guarantees a better traffic situation in and around those centers is the introduction of other effective measures to discourage car use (at all or when heading to the old centers) [Fontana 1999]. One such measure that has been introduced in Italian cities was on-street parking pricing. Parking pricing has been introduced along the streets inside the centers and in a large "crown" around the centers and has been consistently extended. This measure has made it even costly to leave one's car on the fringe of the old city and thus has managed to induce people to use public transport more frequently when wanting to get to the inner area. This has helped to a large extent to combat the typical congestion from this practice in the areas just outside the historic centers [Fontana 1999]. Pricing inside the centers on the other hand disallows long-term parking. It also signalizes the scarcity of this resource to the city citizens and may discourage families from owning a second or third car.

The aim behind introducing parking pricing is mainly to relieve congestion, reduce traffic volumes and discourage car trips into the inner city, especially those trips which are related to work and study (commuters, students, apprentices etc), as these users

could leave their cars at Park & Ride lots and shift to non-motorized transportation modes. Another important objective behind parking pricing and congestion charges is yielding revenues to finance other transport infrastructures. For this to function properly, illegal and chaotic curbside parking around the historic center for cars that attempt to resort to parking in surrounding areas to avoid payment, should be rendered completely impossible as the problem will only be "shifted" but not solved also around the areas where parking pricing has been introduced. Many studies from Germany examining the impact of parking pricing but also the effects of eliminating all parking from the inner cities has always shown the potentiality to shift to other transportation modes. Parking pricing also means introducing different fares depending on the "sensitivity" of the area where the park space is located. Most expensive fares are inside the old center and in its first fringe.

Another countermeasure to car usage inside inner areas is the reorganization of traffic, conveying long- distance trips on larger streets with no curbside parking along them, whereas short-distance trips should be spread on a network of local and traffic calmed streets.

Road Pricing (Congestion Charge):
Instead of covering transportation costs indirectly from taxes, enforcing fees for motorists travelling within congested areas has proven to reduce congestion within tolled areas substantially. In London, for example, the boundary of the tolled zone extends 21km², including Central London, London's primary commercial and entertainment center and extends a little beyond its inner ring road. A payment of £10 is required each day for each vehicle traveling or parking on public roads within the Congestion Charge Zone between 7a.m. and 6:00p.m. (Monday-Friday only); a fine of between £60 and £180 is levied for non-payment. Some vehicles such as buses, minibuses, taxis, ambulances, fire engines, police vehicles, motorcycles, very small three-wheelers, alternative fuel vehicles and cars used by disabled people are exempted from the charge. The 100% discount is received upon

Fig.2- 48 Congestion charge zone in central London (in orange) after removal of the western extension in January 2011
(source: Transport for London 2011, www.tfl.gov.uk)

registration with "Transport for London", the local government body responsible for the transport system in greater London, after paying a yearly fee of £10 per vehicle (except for local authorities and emergency service vehicles that do not have to pay anything). The green vehicles that are exempted are cars that emit 100g/km of CO_2 or less and meet the Euro 5 standard for air quality as well as the new electric and hybrid electric plug-in vehicles. Residents of the zone are eligible for a 90% discount. Studies have shown a reduction in vehicle numbers, increased average travel speeds from 13km/hour to 16km/h and car drivers mostly transferring to public transportation. All revenues earned from operating the Congestion Charging measure in the first ten years must, according to the law, be spent on improving transportation for the benefit of all [Transport for London 2011].

Such measures are always feared to threaten retail trade inside city centers and even become a reason for some businesses to relocate from the tolled zones to the suburbs and thus contribute to the depreciation of inner cities as good business locations. But the London example has shown that many industries support the pricing as it cuts delivery times by as much as 50% hence saving costs. The same applies to employees of many companies that now spend less time in traffic jams than before, some retailers however blamed the measure for sales' losses, but these are mostly bulk good retailers that rely on customers coming by private cars. A study examining the impact of the congestion charge on the retail sector has shown that it had no impact on the retail in central London on the whole [Quddus, Alon & Bell 2007]. Researchers see that the charge's success in London has much to do with its tight urban structure and limited road capacity, the particularly low level of automobile commuters to central London and availability of good transportation alternatives like the subway, bus, cycle and pedestrian networks [Litman 2006].

Additional Economic Penalties:
- Fuel taxing
- High vehicle registration costs

2.3.4 Car-free Housing Areas

These are the latest development of alternative transport policy strategies that take into account the needs of car-less households that account for up to 50% of all households especially in dense central areas of cities. Most car-free residential developments are in new developments whereas little experimentation with car-free planning in existing communities has taken place. The approach features a residential quarter with a whole network of car-free residential streets, squares or villages and vehicle access is approached and controlled in various ways, but it is assured that car-free developments should be permeable in all directions for pedestrians, cyclists, and public transport where appropriate, but not for private motor vehicles.
Thus in some developments removable barriers are used to fil-

Fig. 2- 49 (right) Plan of the car-free residential district of Vauban at its initiation (source: amended plan by Melia 2006, original by eRich Lutz)

Fig. 2- 50 A tram line passes along the main axis of the Vauban residential district (source: Melia 2006)

ter emergency vehicles and heavy deliveries or service roads are made wide enough for the passage of single vehicles. In the car-free district of Vauban in Freiburg Germany, vehicles are allowed along the residential streets at a walking pace for dropping off passengers or delivering, but not to park. No parking facilities inside the quarter are provided, whereas a multi-story parking facility at the fringe of the quarter is usually provided for visitors and the small percentage of residents that still own cars, (approx. 20% of all residents) [Melia 2006]. In the car-free quarter of Stellwerk in Cologne, the number of parking spaces is estimated as follows: 0.1 parking spaces per residential unit for visitors and max. 0.2 parking spaces per residential unit for residents [Herbertz 2009].

Clearly in order for such developments to be viable, they need public transport of sufficient quality,
frequency and comprehensiveness, so they usually are close to a main rail line or served by trams.

Fig. 2- 51 (above) A car-free residential street in Vauban where children play freely without supervision (source: Melia 2006)

The physical design features different bike paths in terms of width and finishing material so there are the main and secondary, also small squares with benches are provided for social purposes and differentiation is also made between public, semi-public and private spaces. Studies have shown that biking has become the favored transportation mode in some of these quarters, and although bike racks and bike shelters are available, there has been demand for more racks in front of houses. Car-sharing service, in the form of a few, well-visible and relatively convenient parking spaces for public cars belonging to a local car-sharing service are part of the scheme and these play a significant role in facilitating lower car-ownership by offering the reassurance to residents who may occasionally need a car and a further incentive is of-

fering residents special tariffs to use them. The scheme is additionally supported by a "mobility station" where pushcarts and transportation carts can be rented free-of-charge.

There are some Japanese cases where car parking is restricted to the outer fringe some 3-10km away from housing areas. Since these residential areas are additionally connected by trams, subways or busses, most residents give up the use of their private car during the week (the Japanese population works long hours), ride their bikes and public transportation and leave car use for the week-ends and leisure purposes. Families then go by bike, bus, tram or subway to a peripheral parking garage to begin their car use. Propagators of "living without a car" highlight the saved costs of such developments that need fewer parking spaces per housing unit, less infrastructure works and diminution of street cross- sections.

2.3.5 Integrating Land-Use and Transport Planning
Coordination between land-use planning and transport has become a key element in European efforts to improve sustainability. Various local and regional strategies have been introduced across different European cities all aiming at shortening trip lengths and facilitating the shift towards more environment-friendly modes. This occurred when it has been ascertained that the spatial distribution of housing, work, leisure, education and shopping determines the distances that need to be covered by urban transport. The more urban structures are compact, dense and land-uses mixed (especially having job densities roughly similar in their pattern of distribution to population densities) the less traveling between origins and destinations is required and the possibility that trips can be short and therefore easily made on foot and other non-motorized modes, but the more land uses are separated from one another and settlements sparsely built and scattered, the more trips are generated, the longer distances need to be covered and the harder it becomes to connect places by sustainable transportation modes.
Experience from Asian cities has shown that high urban densities present potentials for viable public transport use even in high income cities and it creates good opportunities for non-motorized transport even in medium-density cities [Barter 2000], but it was stressed that although high density provides such an opportunity it does not guarantee it; hostility of the street environment for people on foot or on bicycles can discourage walking and cycling even if density is there.
Some have set the critical density threshold, above which high frequency rapid transit services become financially viable, at 100 dwellings per hectare [Taylor & Sloman cited in Taylor & Sloman 2011], some place it at only above 30 dph, so it is dependent on the local context. Residential density and access to public transport are two variables that are seen to affect car-use and higher density is associated with lower car-ownership.

Fig. 2- 52 Electric charriots in Split
(source: courtesy of Poutchy-Tixier)

Today, the most influential urban development model that has gained currency in Europe is the "comapct and mixed city", referred to also by the name "the short trips land development" which sees increased density, mixed land-use and polycentrism as essential for a sustainable urban development. The model stresses the importance of lively public spaces as important components of urban living in addition to ecologically upgraded urban spaces with good "staying qualities" in neighborhoods. Other key land-use strategies include infill development, brownfield redevelopment, focusing development along important transport corridors and nodes (public transport oriented development), revitalizing existing centers and reinforcing subcenters with substantial residential and job concentrations, banning greenfield big-box stand-alone malls, coordinating the amount of new development allowed with the level of available transport service in addition to focusing the most intense development where transport access is plentiful (the ABC dutch system).

2.3.6 Considering Non-Spatial Characteristics

In addition to the above, concern for non-spatial factors and their influence on travel behavior have increasingly gained ground, when researchers began to stress the need for controlling socio-economic and demographic factors like car-ownership, income, economic group, age distribution of the population, household types but also cultural preferences to form adequate basis for policy making as these non-spatial factors are proven to influence travel behavior as well [Buehler 2009]. Higher incomes, more cars per household and employment are related to more travel.

Fig. 2- 53 Devices to hinder normal cars from parking in certain locations
(source: courtesy of Poutchy-Tixier)

Empirical studies suggest that non-spatial characteristics influence travel patterns even stronger than a home's location.This further means that transport policies that restrain cars early enough in places with lower car-ownership levels and make car-use less attractive, have the potential to direct cities, even wealthy ones) towards more sustainable development path. But experience has also shown that cities which managed to do so have started restraint before car ownership reached 70 cars per 1000 people [Barter 2000].

2.4 SUPPORTIVE MEASURES FOR A CAR-REDUCED LIFE

2.4.1 Goods Distribution Management within City Centers

Delivery traffic in cities especially in their inner parts constitutes a major cause of congestion, noise and transportation related emissions. Parked and moving delivery vehicles also are damaging to the visual attraction and to the quality of life particularly in historic city centers. Consequently, goods distribution management aims to reduce driving, emissions, queues and the idling of goods vehicles that over-occupy public spaces. Different European cities have dealt with the problem differently but the trend today is towards introducing more environment-friendly and energy-efficient vehicles (hybrid/electric) and the introduc-

Fig. 2- 54 Electric charriots can extend to become electric delivery trains serving larger commercial areas in historic centers
(source: courtesy of Poutchy-Tixier)

tion of an electronic access control system (based on automatic plate number and face recognition technology, by installing cameras at historic city gates) developed to regulate the access of private commercial vehicles in the inner city and limit it to specific times during the day, thus decreasing the number of private goods deliveries. Such policies have been implemented in Genoa and Cracow. In other cities logistic centers are being established near the old towns, from where clean vehicles distribute goods and parcels received from different delivering companies like in Stockholm old town, thereby reducing the number of delivery car trips and their emissions [Ottosson 2005]. In Bremen, Germany, an environmental loading point (ELP) has been established in close proximity to the pedestrian zone of its inner city which is exclusively used by low-emission delivery vehicles (with an emission standard of Euro V). The size of these vehicles can be up to 7.5 tons and approx. 7.50 meter long. As an additional incentive to use enhanced environmental vehicles, this environmental loading point can be used outside of the usual delivery times to the pedestrian area. Such Euro V vehicles receive special authorization and a transponder so they can be easily identified [Herz, Henrich & Vater 2008].

In European city centers with extremely narrow medieval streets, planners resort to the introduction of special sized vehicles. In addition it is necessary to make sure that parking spaces needed by delivery vehicles are not invaded by random parking by regular cars especially at strategic locations. This has been solved by installing devices on the street surface that would obstruct normal cars but would not affect delivery cars (see figure 2- 53). In Split, delivery for boutiques in the city center takes place using small electric chariots which can extend to become "trains" (a convoy of vehicles) to supply larger areas [Poutchy-Tixier 2009], whereas in the historic city of Perugia, where conventional delivery has proven inefficient due to the narrow and steep streets, an innovative approach is being tested where goods are transported through underground tubes using magnetic fields and existing rights of way alongside roads and railways. The goods are placed in capsules from metal pipes (60cm in diameter) with a carrying capacity up to 50kg and are levitated and propelled forward by the magnetic mechanism at up to 1,500 km/h [Put that in your pipe and poke it 2011].

2.4.2 "Time Sharing" Separation or "Time Zoning"

Time zoning is a broad, but relevant approach that allows different activities (or street usage) to take place in the same place (using the same street space), but specifies the time of day, week, or even year during which each of these activities may take place. Accordingly, a street doesn't have to serve merely as a link for motor vehicles around the clock; it can become pedestrian in the evenings. Time zoning also provides an efficient use of a given location by spreading activities in it over periods of time, and even encouraging new activities to take place there when that

Fig. 2- 55 An environmental loading point was established close to the pedestrian zone in Bremen, to be used exclusively by low emission vehicles

(source: Herz, Henrich &Vater 2008 p. 72 , photo provided by the city of Bremen)

location is underused. Examples of this are many, like allowing parking along certain streets only in the evening, when traffic has calmed down and regular businesses have closed, or using on-street parking spaces for businesses during the day and for residents during evening hours, staggering working hours for different institutions so less traffic is generated at the same time, devoting a certain street to pedestrian use during evenings, weekends or on holidays in the warmer months, also banning traffic during hot days when traffic-related pollution effects have increased. Also, the loading and unloading of goods may take place at night or early morning, when traffic is minimal and loading vehicles can park along commercial streets without hindering other users. In the same vein, a public building such as a school might serve as a meeting place for social and cultural organizations in the evening and at night or on weekends. It also might become a community training center or serve as a sports camp during the summer.

In addition to this, experiments all over the world have been launched where motorists have been encouraged to give up their car, first for a few hours on Sunday, later extended to the whole day. In Europe such car-free days were prompted in 1974 when the energy crisis was the reason for four Sundays without a private car. Other cases included night driving prohibition in special housing areas or health resort areas [Monheim 2008]. Later car-free local Sundays have become very popular for tourist purposes. From Jakarta to New York City, such closures have been received enthusiastically and have attracted masses of cyclists, skaters and walkers to celebrate the event. In Japan, time sharing strategies are much more common, especially in big cities like Tokyo or Osaka closures of busy roads take place daily during summer at lunch time for one or two hours, when masses of office people have their lunchtime break outside on the street surface that becomes a lunchtime promenade, where only some minutes earlier still thousands of cars had passed by. The same strategy has been developed for the safety of school children by closing all streets around school locations for about one hour in the morning and noon time. Thousands of so called school protection areas have also been introduced in Japanese towns [Monheim 2008].

In the Middle East, during the first Gulf war and due to rocketing gasoline prices, the government of Jordan issued a law where cars with even numbered plates could drive on certain days, and ones with odd numbers on other days, which made acquaintances and neighbors cooperate and share cars for job and school trips.

Cracow Zones

A good example of a European historic city that introduced access control to its city center by applying a physical and time zoning management in its inner city is Cracow, Poland where the city center is divided into three different zones:

- Zone A (in yellow, see figure 2- 41): has been limited to only pedestrians and cyclists since 1993
- Zone B (in green): is a zone including housing where pedestrians enjoy absolute priority, driving speeds are 20km/h and parking is allowed exclusively in marked areas and only privileged vehicles, technical services, taxis and hotel guests can enter this area.
  Recently extending zone B to include the ring road around the historic center as well as the elimination of on-street parking and parking in public spaces in this zone have been initiated but full implementation was delayed as the erec tion of alternative underground parking for residents has been slow.
- Zone C (in blue): is the zone where limited parking along streets is allowed (up to two hours) on regular days between 10a.m. – 18p.m. with a ticket that can be purchased in kiosks, at post offices, the municipality or from parking guards. The reorganization of traffic direction on some streets has been necessary once Zone B was extended

Fig. 2- 56 Cracow inner city zones
(source: CIVITAS n.d., *Integrated Access Control Strategy in Krakow*, http://civitas-initiative.org/docs1/CIVITAS_CATALIST_C2C_Access_Management_Krakow.pdf, viewed 10 October 2011)

In addition to the above, an electronic vehicle identification system to control the cars entering and leaving zone B has been planned, whereupon cameras and simulating dummies would be installed at different entries and/or exits to the historic center to identify and eliminate illegal driving into zone B.

2.4.3 Car-Sharing

This concept was first started in old city centers that were shaped before mass motorization, where most houses had no garages. Nowadays it is most common in major urban areas where public transit, walking, and cycling can be used most of the time and a car is only necessary for out-of-town trips. For people living and working in such areas, who do not need to travel by car more than 10,000 kilometers per year, it is more economical to use this service than to own and be responsible for the upkeep of a personal car.

The principle of car sharing is simple: individuals gain the benefits of private vehicle use without the costs and responsibilities of ownership. These vehicles are taken care of by the organization that owns a fleet of cars and light trucks in a network of locations, either in the neighborhoods themselves, at transit stations or near a concentration of businesses. In addition to this, they are a new public transport opportunity with greater flexibility for users, as they can be used at times when other modes are not running (available around the clock seven days a week) and offer a guaranteed free parking space especially where it is limited and costly (e.g. inner cities). One of the earliest European experiences with car sharing was motivated by economics and can be traced to a cooperative known as "Sefage" (*Selbstfahrer Gemeinschaft*), which initiated services in Zurich, Switzerland in 1948, and remained in operation until 1998. Individuals, who could not afford to purchase a car, shared one instead. Elsewhere, a series of
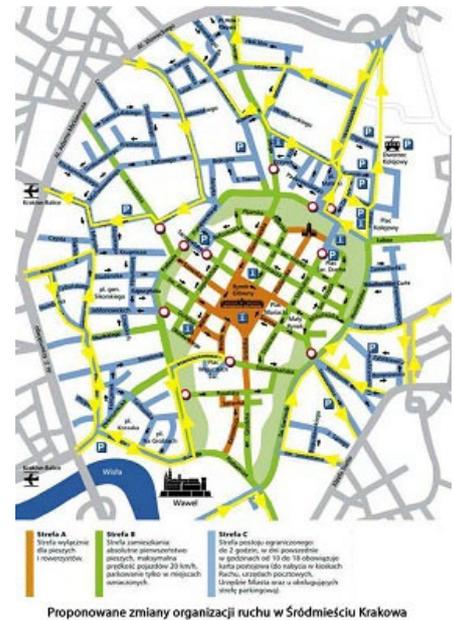
Fig. 2- 57 Stackable electric vehicles, designed by Franco Vairani & MIT Smart Cities Research team
(source: Jha 2005, original photo taken by Franco Vairani, MIT Department of Architecture)

Fig. 2- 58 "Mobility Points" placed at important traffic interchanges like main transport terminals, from where one can continue his trip by one of many different alternatives (source: Topp, H 2010, 'Mobilität undVerkehr im postfossilen Zeitalter', Kongress der Stadt Fellbach & der Region Stuttgar, p.32, photo by Glotz-Richter)

shared car experiments were attempted but members typically pay for use through hourly rates and subscription-access plans. The majority of car sharing operators manage their services with advanced technologies, which can include automated reservations, smartcard vehicle access, and real-time vehicle tracking.

One major impact of car sharing on the transportation system is a reduction in vehicle ownership (according to recent studies, a car sharing vehicle reduces the need for four to ten privately owned cars in continental Europe), it also contributes to decreasing the parking pressure inside city quarters.

Although the concept of car-sharing promises us a drop in car use at the outset, for who needs to own a car if it remains parked most of the time, still, other professionals argue against its usefulness, believing that ultimately car-sharing doesn't have the potential to substantially affect the modal split.

Electric Vehicle Sharing

When car sharing clubs adopt electric cars, the advantage is even bigger. Electric vehicles are clean, green and quiet and offer obvious advantages over conventional petrol or diesel cars in city environments. The first electric car share club was the Liselec scheme in La Rochelle, France in operation since 1999, with fifty electric cars parked in seven recharging stations near high use locations in the city, such as the main train station, the bus station and the university. The cars are available for pick-up around the clock, every day of the week. Users must have a driving license in order to take out a subscription. In exchange, they receive a pass unlocking any of the fifty cars. Users can leave the cars at any recharging station, the scheme operator must then redistribute the cars if necessary at the end of the day.

2.4.4 Combined Mobility: Energy-efficient Vehicles with Public Transportation

In some countries like Germany it has been encouraged to use car sharing as a supplement to public transportation, including shared combi tickets that allow the easy transfer from one mode to another, with car-sharing providing the first or last leg of a

journey (mobility on demand that allows one to hire an electric car, a bike or a scooter one-way); thus car sharing has been elevated to become the fourth column of the "green or soft modes" (walking, cycling and public transport) in the belief that by doing this and with the right integration of traffic modes, an environmentally-compatible city traffic can be achieved [Huwer 2002]. Especially noteworthy in this regard is the latest CityCar Project led by William Mitchell's Smart Cities Group at the Massachusetts Institute of Technology (MIT). The innovation in this newly developed transportation concept is based on using vehicles that are well-suited to city life: they are light-weight, small, emission-free and shared two-person-electric vehicles (sixty percent the size of a Smart car) designed for slow speeds by the project member Franco Vairani, yet MIT researchers underline the importance to make these cars complementary devices to existing mass transit transportation [Jha 2005]. Another novelty is the possibility to fold these cars vertically (like a cat arching its back) and stack them together like supermarket shopping carts to save space; as three CityCars can fit into one traditional parking space and six to eight if stacked [Clancy 2010]. They are promoted as the best choice to carry people the first or last kilometer.

Their stations, which are also used for recharging, are located at major origin and destination spots, such as transit stations, but charging equipment can also be incorporated in a parking meter. Other compact and energy-efficient vehicles, which are also viable alternatives, are foldable electric scooters, bicycles and Segways.

Multimodal and Intermodal Mobility: examining La Rochelle as a model city

A good example of a city with such a functional multi-modal system is La Rochelle, France with 150,000 inhabitants. that is also a pioneer in the use and production of electric vehicles. Here the mobility system is spread over multiple choices including a multi-level bike service, car sharing service, electric car service, carpooling, bus, electro-solar sea ferries and train services:

A special brochure [La Rochelle Mobilité 2008] provides an explanation of the different mobility components in the city: for instance the multi-level bike services in La Rochelle differ depending on the intended duration of use. So there is the self-service bike meant for short trips around the city center or to move from one transit stop to another, stops with these bikes are spread all over the city, expansion of which is planned to 55 stations offering 350 bikes. Another service allows renting a bike for a medium or long period of time (one month, six months or one year) and there is the yellow tourist bike, for leisure and touristic uses. Similarly, a service is provided with the electric-car sharing service, including seven stations with 50 cars. A unique type of public transport subscription package allows users to easily access and benefit from all the above-mentioned modes thanks to a unique smart card giving access to all public transport means spread all over the city, the card can be reloaded online, students are given yet another special rate to encourage them to use envir-

Fig. 2- 59 (left) A gate effect marking the entry to a shared space in the canton of Luzern in switzerland
(source: Kanton Luzern 2009)

Fig. 2- 60 Major square Roermonder Platz, transformed into a shared space
(source: courtesy of Professor Jürgen Gerlach

onmentally-friendly transport modes and awareness campaigns accompany this program. Furthermore, the system is supported by additional transport amenities and new technologies like bike & ride stations, some located five minutes away from the center and shuttle buses are provided every five minutes in addition to a bike-rent service. Also numerous sheltered bike-parks "vélo parcs" have been created so users feel more at ease when leaving their bikes at bus-stops. A service has been provided via electronic terminals and by phone (sms) offering public transportation users reliable and constantly updated information.

2.5 Post Traffic Calming

2.5.1 Monderman's Shared Space

This concept is based on the conviction that the environmental context has a stronger influence on driving behavior than legislation and formal rules. It attempts to bring the different street functions— access, linkage and an outdoor social "living room" together in one largely undivided space and surface. The physical design of the street, its "feel" and overall layout should convey a message to road users to adapt their behavior to its circumstances and to provoke and entice people to negotiate their moves around this space with each other. This takes place by applying psychological behavior principles and social protocols rather than strictly prescribed rules. Unlike the "*Woonerf*", its application isn't restricted to residential streets.

"Our behaviour in a theatre or a church differs from a pub or in a football stadium as we understand the signs and signals through years of cultural immersion. Likewise if we see children playing in the street, we are more likely to slow down than if we saw a sign saying 'Danger, Children!'"

Hans Monderman, 2006

Hans Monderman, a traffic engineer from Holland, and the biggest propagator of the concept, was dissatisfied with the conventional traffic calming measures. He demonstrated how street reclaiming could take place by changing the psychological feel of streets so they feel less like a corridor owned exclusively by cars and more like a series of interconnected outdoor living rooms in which motorists are mere guests. He began his experiments in the northern villages and towns of the Friesland province in Holland with simple design and landscaping measures that emphasized the distinctive history and context of each settlement. "a village
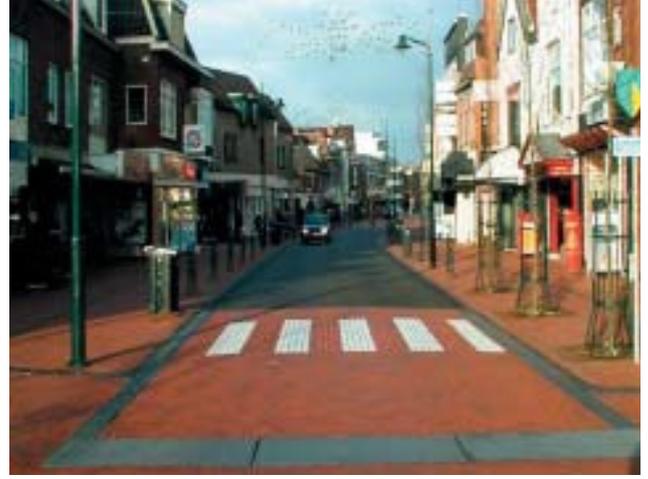
should feel more like a village" and "a space designed primarily for traffic is hostile to social activities; however, a space designed primarily for social activities can easily coexist with traffic but in a far safer way" were his credos. He deliberately removed road markings, signs, lights, chicanes and road humps and all the artificial interventions that cluttered the streets [Engwicht 2006]. To his own astonishment, Monderman recorded reductions in speeds up to 40% (while earlier reductions in speeds were only 10% by use of conventional traffic calming).

With time it has been proven that the schemes haven't only been successful in small homogenous villages and towns, busier town center intersections and main shopping streets have soon followed suit. The high street Bremerstraße in Bohmte, Germany, is a good example, where the conversion has markedly improved the environmental quality, the social quality and achieved smoother traffic flows, and most importantly, a clear fall in accidents involving human deaths or injuries [Deutler et al. 2010]

The concept is winning more acceptance especially in places where car accessibility is too vital to give it up. Authorities as well as motorists have been more and more persuaded since results have shown that despite lower speeds cars still manage to pass the street faster as traffic lights have been removed.

The difference between this concept and traditional traffic calming:

- Traditional traffic calming forces motorists to slow down by putting physical obstacles in their way
- Shared spaces *entice* motorists to slow down by creating the feel that one is entering a living space, to which one should adapt, shared space also creates intrigue and uncertainty at intersections enticing vigilance
- Unlike traditional traffic calming, these design techniques do not necessarily have to change the physical geometry of the street.

The following criteria are at play:

- Create a shared surface for drivers, pedestrians and cyclists where the different functions— driving, walking, lingering, shopping or enjoying oneself all have an equal share

- Utilize the rule: right before left
- Do without curbs (sidewalk and roadway have the same surface level)
- Remove standardized road signage and traffic lights from the street and intersections, utilize roundabouts, build ambiguity and uncertainty that will require cautiousness from the part of road users and make them engage with their surroundings and their fellow citizens using eye contact (even verbal contact) as a means to negotiate movement.
- Create rooms rather than corridors by using techniques that affect the psychological feel of space and send clear messages about the dual functions of the street, both as a movement corridor and an outdoor living room, this could be achieved by floor designs that signal entry to a new room, by walls, accented entryways, ceilings, furniture and art.
- Create ever-changing streetscapes by using design elements that are unique, movable and changing on a regular basis, in contrast to static streetscapes in which speeds automatically rise because they become predictable with time.

Its propagators emphasize the distinction between "traffic zones (space given solely for the movement of traffic like freeways) and the "public realm" (that is unpredictable and multipurpose)". Experts, however, emphasize that for this to work, the transition between the two worlds (highway/urban public space) should be made absolutely explicit. "Gate" effects should be created to mark this transition. Here public art plays an important role. Once inside this other "reality" drivers will notice a change in everything: surface materials and the disappearance of markings.

Fig. 2- 63 An encounter zone in a historic center with a tight urban structure(source: (source: courtesy of Poutchy-Tixier)

The novelty about shared space is that for the first time the principle of "mixing traffic" is being applied to busier streets and junctions with relatively high traffic loads, equally new was giving up on road signs and introducing the right before left turn rule as well.

In practice, shared space is mainly being applied to busy intersections where pedestrians, cyclists and car flows are high, and to the last sections of the streets leading to these intersections. Other common places for application are traffic squares (major intersections) and forecourts (e.g. in front of dominant buildings like a railway station, an opera house etc) where there is a high demand for pedestrian crossing. Usually no level differentiation is made between the driveway and the sidewalks, but in practice, the goal of "sharing one uniform undifferentiated space by all users" is usually not strictly followed; while some intersections and squares are actually designed and laid out in a uniform material, most adopt a classic roundabout, and in many cases "soft" separation elements like light intermittent guardrails, ground markings or bollards are in fact being utilized to guide the movement of pedestrians or shield them from cars. Furthermore, marked pedestrian crossings are being added for the elderly and children and are fitted with tactile elements for the blind, the lack of level-differentiation necessitating more of the lat-

ter. So the mixing principle is not often implemented, and from the actual implemented examples it is easy to discern that such design treatment gives spaces an illegible and chaotic feeling.

Limitations of the Concept
Shared Space today has its supporters as well as its skeptics. Some recommend it only to 800 meter-long stretches believing that concentration (engagement with the surroundings) and reduced speeds cannot be guaranteed over longer times than this [Gerlach et al. 2008], whereas others, like the prominent urban designer Jan Gehl, consider shared space inadequate because it does not prioritize pedestrians, therefore does not ensure a good and dignified quality of life for pedestrians, especially children and people with reduced mobility [Gehl 2010].
Shared space is mainly seen as a tool for upgrading streets and public spaces to turn them into more livable places. Today, we are still in the experimenting phase, although many successful examples have been achieved in Europe, shared space cannot be considered a cure-all measure, although it has received the acceptance of the public, there is still skepticism expressed by some regarding the subjective uncertainty they feel within the shared space that needs to be still dealt with. Bikers also expressed some discontent and concerns. It could be that applying shared-space in combination with more traditional traffic calming measures, would bring the best results.

2.5.2 Encounter Zone (*Flanierzone***,** *Begegnungszone***):**
This concept was introduced in Burgdorf, Switzerland in 1996 for the first time and is the Swiss devised alternative to the "*home zone*" (refer to section 2.2.5). The two concepts are similar in that the "Encounter Zone" also gives pedestrians priority, but in contrast to the latter, this concept is also put in place in areas with predominant commercial uses and the speed is limited to 20 km/h; it is to some extent a compromise between the noisy thoroughfare on which pedestrians and cyclers fear for their lives and the pedestrian zone limited to pedestrians, in which retailers fear for their clients. It has grown from the persuasion that classic pedestrianization is incompatible for areas with a high proportion of customers coming by car. Its credo has been "If you go along with me and keep the parking spaces, I can go along with you and drive 20km/h in the business precinct. "*Lässt du mir die Parkplätze, so lasse ich dir Tempo 20 im Geschäftsviertel*" [Schweizer 2002]. Here also, physical changes in the streets' cross-sections are a pre-condition, but they are less elaborate than what is required in the case of "*home zones*" (shared-surface residential streets) and therefore less costly.
According to transport professionals the concept has also been applied as a countermeasure against the growing number of shopping malls especially in smaller towns, it was necessary to prevent a loss in purchasing power [Schweizer 2002].
Today, the procedure has been simplified and there are no longer restrictions concerning the size of the encounter zone nor the

traffic volume limits, so it is now common to apply it to streets with low, middle and high traffic volumes, and it is being applied to single residential streets as well as in commercial districts, areas associated with schools or with train stations
and in historic precincts. Public transport is also allowed.
It is noteworthy that the priority given to pedestrians (regardless of their disabilities) in the encounter zone is not a mere nice gesture, but has become legally protected as are the speed limit and parking ban outside marked areas [Schweizer 2006; Schweizer 2010].

2.6 SUMMARY

2.6.1 Traffic Calming Today
As has been seen, experimentation with traffic calming, especially in Europe has been considerable. While many different concepts have been developed, concepts that required more "elaborate" and costly designs usually lost ground to concepts that could be more easily implemented, but the trend has usually been towards more and more "simplicity in design" and less rigorous divisions of the street space. In the last ten years, it has been the concept of shared space and car-free residential areas that have been dominating the scene. While in some countries (e.g. Germany) it is attempted to better define the scope of shared spaces, other European countries, including the founders of the concept (the Keuning Instituut in the Netherlands), prefer to treat it as a flexible tool kit that should be tailored to the context, by applying designs that lead to better thoughtfulness in using the street and to "mutual consideration" of its users. Thus various interpretations of the concept have formed and countries are learning and getting inspired from each other. Switzerland's version of shared space has translated into the simplified "encounter zone" while in England the approach was mainly applied in major cities (stretches of major streets) with designs that functioned well because of their uniqueness, thus showing that their application is adequate only in specific areas.

The word traffic calming today denotes the whole assortment of organizational, structural and traffic regulative measures used to mitigate the disadvantages brought about by motorized traffic in terms of the traffic situation, urban situation as well as the environmental quality of communities.

2.6.2 Summary of Most Popular Concepts

Measure	Best Applicable to	Separation between modes	Maxim. Speeds	Precedence is enjoyed by	On-Street Playing	Special design consider-ations	Parking	Traffic Level
Pedestrian Zones	In Europe: mainly in commercial (or mixed use historic quarters)				Allowed			
Traffic-calmed Commercial Street/area	Central commercial zones Main commercial streets in the quarter		20km/h		Not Allowed	Good Crossing possibilities		
Traffic-calmed Areas (*Wohnstrasse*)	Single residential areas, with little traffic, where emphasis is on the living quality			Pedestrians	Allowed	Explicitly showing that staying activities come 1st place, elaborate & costly	Only in marked areas	
Tempo 30 Zones (area-wide traffic calming	Uniform zones within built up areas beyond the major road network		30 km/h	Motorized vehicles	Not allowed	Not necessary, If introduced, are normally simple not costly	In marked areas	
Monderman's Shared Space	Sensitive sections of main commercial streets Local shopping streets A village through-road/town center streets (Places with high pedestrian and cyclists flows (they dominate the scene) and need for frequent pedestrian crossings	No separation through soft separation	50 km/h max.	No one, all have equal rights Turning right priority (right hand turn rule)	Not allowed	No signage, emphasis is on distinctive environmental elements not technical measures Same leveling of sidewalk & driveway unnecessary, soft separation elements preferable roundabout at intersections	Preferaby if complety banned, left to	Best if ≤ 8000 car/24h, If speeds are low ≤ 14000 car/day
Encounter Zone/Street	Village and neighborhood centers Residential and commercial districts Railway station squares	Unnecessary between cars and pedestrians	20km/h at walking pace	Pedestrians but they should not obstruct cars unnecessarily, but they can cross the road everywhere	Not allowed	Start & End of Zone/Street should be well marked (Gate effect + signage Other design elements (furniture) discussed with residents of the area/special crossing areas with tactile	Only in marked areas	

Chapter III
CASE STUDY I

SITUATION ANALYSIS
OF TWO URBAN QUARTERS IN
A TYPICAL HISTORIC
URBAN CENTER

Case Study Aleppo

Aleppo City:
Main Emphasis: traffic management, urban accessibility and street space design in a well-preserved Arabic historic center

3.0 INTRODUCTION

The aim of the first Case Study is to identify the most common problems facing urban streets in the context of a traditional Arabic city (*medina*) with a traditional urban structure (Type A) in the MENA region, and to critically dissect today's practices, planning tendencies and approaches in street design and traffic management using the example of Aleppo old city, aiming all along to answer the following questions: what are the most typical problems, constraints related to accessibility within a traditional urban structure, what issues need to be considered, how have the problems related to traffic and circulation been dealt with in the special context of a traditional Muslim city, what challenges does it incur, what is the situation with the commercial as well as residential urban streets, and finally, are the streets for people. The case study will additionally be supported by data and experiences from other traditional city centers. Although they possess functional similarities, the degree some cities were preserved differs, as some were subject to modernization attempts, while other cities were spared radical interventions and are still intact within their medieval walls.
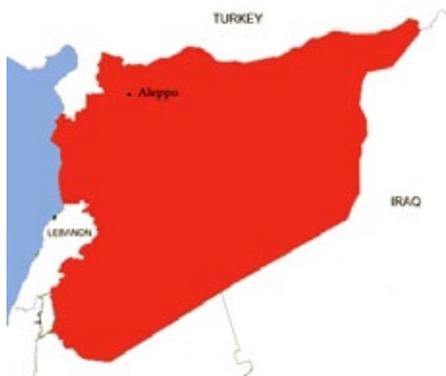
Fig. 3- 1 Geographical Location of Aleppo city within Syria

Buffer Zones
Major Streets
Old City -Heritage Site
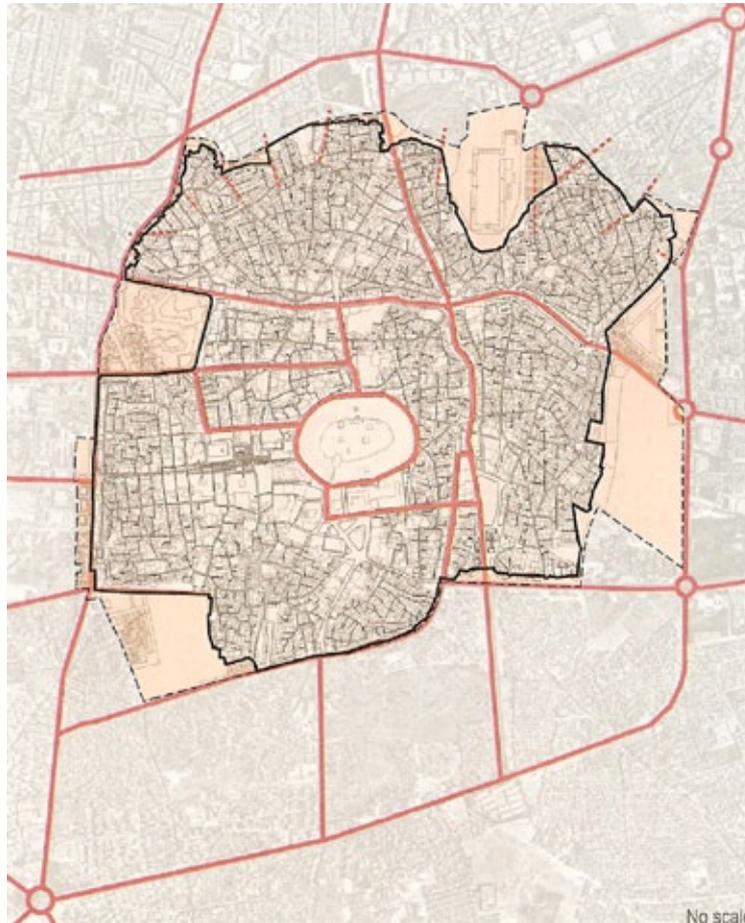
Fig. 3- 2: Major street network in and around historic Aleppo
(source: DOC & GTZ 2005)

3.1 City Level Analysis

No scale

3.1.1 Site and Origins of the City

Aleppo is one of the oldest continuously inhabited cities in the world without interruption for approx. 5000 years. Historically Aleppo was a sort of a "desert haven", an important traffic node for pilgrims and trade exchanges that developed into the Middle East's chief marketplace thanks to its strategic location on the Silk Road, halfway between the Orient and Occident, the Mediterranean and the Euphrates. It acted as a melting pot of ethnically and religiously diversified peoples eventually becoming the third most important city in the Ottoman Empire after Istanbul and Cairo in the 16th and 17th centuries. Its development came to a sudden halt with the opening of the Suez Canal in 1869.

• Location

Aleppo is an inland city located in the northwest of Syria 355klm north from Damascus. It covers an area of 190 km² and it is the capital of the Aleppo governorate with a total area of 18500klm². Its old city occupies around 3.5 klm² with 16,000 plots.

The old city lies on the alluvial plain of the river Quweiq at 379m above sea level, its townscape is dominated by the impressive citadel occupying the *tell*; a landmark hill with an elliptical base (325 x 450m) that rises 50 meters above the city's level, towering over the city in a unique manner.

It has been ruled by many cultures, including the Hittites,

Persians, Greeks, Romans, Arabs, Mongols, Mamluks and Ottomans.

• Climate
Aleppo has a moderate climate, with short, cool, wet winters and long, dry, hot summers with prevailing winds blowing from the west. Its surrounding region, parts of which are semiarid, supports extensive agriculture as well as the raising of livestock (Aleppo Chamber of Commerce)

• Population
At the turn of the 19th and 20th centuries the population of Aleppo included Muslims, Christians and Jews, and five various ethnicities; Arabs, Turks, Kurds, Armenians and Assyrians. Today its population of almost two million is also comprised of the same ethnicities that cohabitate together. The old city is home to only about 5% of the 2 million population of the city as a whole. Around 109,000 people currently live in the old city as the result of exodus.

Population growth in Aleppo:

Year	Number of inhabitants
1880	120 000
1920	111 000 (approx. 95 000 in the OC)
1970	640 000 (approx. 172 000 in the OC)
1994	1600,00 (approx. 106 000 in the OC)
1998	1750 000 (approx. 105 000 in the OC)
2003	(agglomeration:2 millions) 109,000 inhabit the old city

3.1.2 Aleppo: Urban Streets development
The most formative periods in Aleppo's morphological development can be summarized as follows:

• Pre-Islamic Period
The Hellenistic and Roman eras left their traces in the urban fabric with their visible straight rectangular street grids still preserved in its covered souks.

• The Islamic Period
In this period that extended from 637A.D until the French Mandate in1914, Aleppo hosted many Muslim dynasties namely the Ayyubid, Abbasid, Umayyad, Mamluk and later Ottomans.
In this period the city acquired its dense urban fabric, a commercial core centered on the main souk, considered the longest covered souk in the Middle-East, which was established along the traditional east-west axis of the Hellenistic town, with the main mosque occupying the former space of the agora. The souks consist of a number of parallel rows of covered market alleys linked by perpendicular connections.
Between the shops are entrances to larger buildings that are situated behind them, such as storehouses (khans), manufacturing entities (*qisariyas*), mosques, schools (*madrasas*) and baths, most of them having their own courtyard.
The city was based on a much sophisticated hierarchic street sys-

Fig. 3- 3 The grid from antiquity still visible in the urban structure of the main souk area (hatched streets)
(source: after Gaube, in Gaube 2000, p. 102)

Fig. 3- 4 A model showing the main historic axis "al-Shari' al-Kabir dividing the city width-wise and leading towards the citadel on top of the landmark hill which dominates the townscape of old Aleppo
(source: Eddé 2000, p.127, photo by Heinz Gaube)

tem that connected the public core of the city with its surrounding residential neighborhoods in a gradual filtered manner. Everyday life took place in a totally pedestrian environment. It is during this period, under the Abbasids, that the city's landmark citadel was built on the former Roman Acropolis, and the city acquired walls and gates when it became subject to Crusade attacks [Busquets 2005].

The Ayyubids' and Mamluks' main contributions to the city fabric were the upgrade of infrastructure and the erection of social, religious and commercial building-complexes like the numerous madrasas and Khans that reign over its townscape today.

• Under the Ottomans (from 1517 until 1920)

During this period, the city had expanded over 400ha and reached 100,000 people [Gangler 2000]. The individual residential quarters started forming into complex spatial structures and social entities. Control over the building heights or street widths were done by the *muhtasib* (provost of the markets). The city acquired larger *khans* and new souks in an attempt to further enhance the city's position as a trade centre in addition to the famous 'tall' and 'slender' minarets adorning the mosques around the Citadel. At the end of the XVII century, the city grew beyond its walls, and the Christian quarter Jedaide started to form.

After a period of stagnation that extended between the 17th and the 19the centuries, came the period of most significant developments that occurred in the late Ottoman years (1860-1920), which included the establishment, in 1868, of the first western-style municipality. Also the first planned "modern" neighborhood, totally separated from the old city, was erected in the northwest, namely Aziziye, with wide streets and a chessboard plan and was later followed by other districts. At the beginning of the 20th century, train stations were built on the western bank of the river Quweiq, and hence further directing the city's urbanization towards the west.

The main novelty or change in the new neighborhoods like Aziziye, was the changed relation between the public and pr-

ivate spheres, where limits between the public and private had been displaced, and thus the separation of the two spheres (the residential quarter and the public space) had been attenuated as houses started now facing the public thoroughfare and where a number of new public facilities had now been introduced like a public garden, a police station, public fountain and even a pump for potable water. The concept of enclosed residential quarters with their courtyard houses and cul-de-sacs has been theoretically abandoned to give way to blocks and multi-familial apartment buildings, namely the "extroverted city house" with numerous windows and balconies opened towards the street [David 2002].

Other worthwhile developments included the transformation of the northern stretch of the moat surrounding the *medina* into a 14m wide street, namely Khandaq Street, bordered by residential blocks, hotels, warehouses and shops. This has given way to a yet another distinct building typology with vertically-graded uses that housed commercial related functions with ample storage space in its ground floors facing the street, and apartments on the upper floors [Gangler 2000].

Both Khandaq Street and Tilal Street west of Jedaideh later developed into important inner-city thoroughfares that connected the old city with the new extensions. With the building of Damascus and Baghdad train stations in 1906 and1912 respectively the city expansion to the northwest wasn't to be halted and Bab-al-Faraj (west of the old city) would become the new center of the "new town" with a large number of hotels, restaurants, shops, garages and bus stations. A public park was built nearby and streets started do be lined with trees.

It is interesting to note that the stagnation period up to the mid 19th century, has allowed the old city of Aleppo to fully maintain its traditional features up to our century, allowing us to marvel at one of the few examples of such relatively well-preserved historic Arabic cities.

• **The Mandate Period (1920-1946)**
In this period the city's population reached 125,000 and modern town planning started in Aleppo with the establishment of a western type city administration in 1925 and with the creation of a corresponding planning department (Service d'Urbanisme). Many public amenities were provided and construction techniques introduced. In 1929, a tram was installed (along the two major spines) to connect between the old city, the new districts and the train stations together, crossing at Bab-al-Faraj, the trams were first horse-drawn then became electrified. In 1930, a cadastral map was provided which was to serve as a basis for all future planning [Bianca et al. 1980].

It was further a marking period in street developments that recalled modernist and urban renewal planning principles that valued the grid as a pattern for organizing urban blocks. The grid prototype was to be used for new developments as well as
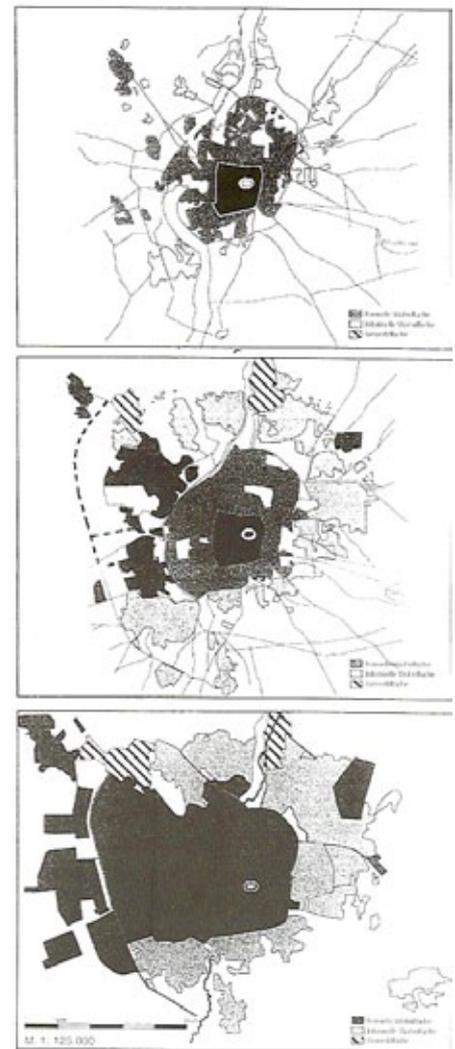
Fig. 3- 5 Growth stages of the city of Aleppo (black represents formal housing, light grey represents informal housing, black & white hatch represents industrial areas)
(source: Gangler 2000, p. 177, after Dahman 1999)

Fig. 3- 6 Tram line at Bab-al-Faraj, 1921
(source: Wikipedia, original: Old Aleppo Album,
Vartan Derunian)

Fig. 3- 7 Entry to Tellal Street from the south
(source: Hreitani 2009, p. 30, original by Godard,
Charles)

for reorganizing the organic pattern of the old city fabric [Lieza & Sergie 2005].

With the formation of the Service d'Urbanisme a series of master plans to control city growth were drawn up by various architects:

Ecochard and Danger's Schemes (1931-1938)
Danger's "Plan d'amenagement, d'embelissement et d'extension" and Ecochard 's "Projet d'Urbanisme" were inspired by European town planning ideas as expressed in Le Corbusier's "Charte d'Athènes" which proposed new extension areas with a street network whose grid was to cut through the old town, thus imposing the law of the new quarters on the old. However these plans remained on paper due to protest of the inhabitants, and since cars had been only recently introduced to the city at that time, vehicular traffic was still not important enough to justify this big-scale road construction [Bianca et al. 1980].

André Gutton's Master Plan
Regrettably though, another master plan worked out by André Gutton found partial implementation in 1954. The plan's major objective was to reassert Aleppo's position as a node for national, regional and international connections with emphasis on freight transport.

Despite some minor concerns about separating housing from traffic in the new residential areas it foresaw two ring roads for the city, an inner one that would surround the old town and irrigate
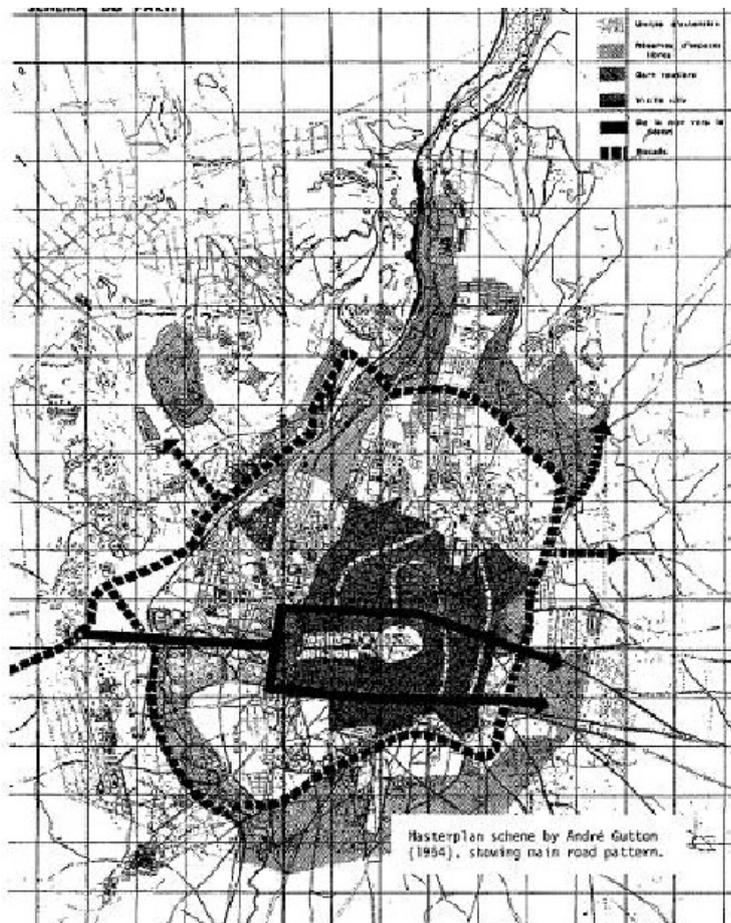
Fig. 3- 8 André Gutton's masterplan of 1954)
(source: UNESCO Report by Bianca et al. 1980)

its *khans* and souks with vehicular access and a second outer one surrounding the metropolitan limits. The two ring roads were to be connected together by two parallel 22 meter-wide streets cutting through the old city centre in east-west directions (from sea to desert) one to the north of the citadel and the 2nd to its south.

Although the partial implementation of this plan entailed a loss of only 10% of the old urban fabric, still, it caused serious functional and social damage. The continuous fabric became isolated units and the new typology of high-rise buildings (six-floors high) that mushroomed along the new thoroughfares resulted in an over-density, overloaded infrastructure, added to this was the loss of privacy, sun and air. (Open space in form of the inner courtyards lost its validity when put next to high rise buildings, and the high buildings prevented cool winds to ventilate the houses around them).

At the time planning practices guided by the principal "*dégager pour mettre en valeur*" were en vogue, thus Gutton's aim was to "expose" the citadel to spectators misinterpreting the laws of Islamic architecture, which isn't primarily intended to be seen from the outside but to be perceived from within, best exemplified by the courtyard structure [Bianca et al.1980] .

This "circular scheme" that generated heavy pressure on the traditional center was imposed without considering the unique nature and conditions of the old town.

Fig. 3- 9 (a) and (b) Vehicular traffic network as existed in 1960s and the proposed Banshoya master plan in 1969)
(source: UNESCO Report by Bianca et al. 1980)

• **After Independence**

Another master plan was developed under Hafez al Assad by the Japanese Banshoya, it further exacerbated the conditions discussed above. Seemingly sympathetic to the old city on the outset; it gave up the idea of the inner ring road and proposed a number of cul-de-sacs to maintain the coherence of the fabric, but the east-west axes begun earlier were to be completed in addition to a new north-south connection through the eastern suburbs and another two avenues across the northern suburb of Jedaideh were to be pierced.

This master plan, that obviously would have sliced the old town and its historic suburbs into isolated bits, and invited through traffic across its parts, would have eventually encouraged the expansion of the new town into the historic fabric and led to its decay.

Banshoya's master plan found partial execution only; an axis was opened as far as the citadel, whereas the other ended in front of southern gate of Bab Qinnisreen, without cutting through the

Fig. 3- 10 The climatological disruption in old traditional houses caused by high-rise buildings mushrooming along new wide streets.
(source: Cantacuzino, SH 1984, 'Aleppo: Bab El Faraj ', *MIMAR 12, Singapore*, pp.24-31, original by Jean Claude David)

rest of the old city. The northern of these new roads though, was linked perpendicularly with the old moat road, which left a sensitive area which lies on the border of the old and new cities in the north-west, namely Bab al-Faraj, surrounded by highways. This eventually led to vacating it.

This result ignited such vigorous protests that finally led abandonment and to the registration of the old city as a historic monument in 1979.

3.1.3 First Warnings against Vehicular Traffic
• First Warnings

When the new city extensions started appearing to the west of the old city towards the end of the Ottoman rule the problem of connecting or separating both settlements did not seem to be on the agenda of the first extension plans elaborated on for the city [Gangler 2000]. Actually until 1980, the *medina* had its own center and the new town had its own, outside Bab al-Faraj west of the *medina*.

It was only in 1980 and 1982 that traffic impact on the old center was studied closer and where it was agreed that traffic-related activities were the main generators of dynamism within the urban system. The two studies were conducted by a team of international experts (Stefano Bianca among others) at the request of the Syrian Government, but on behalf of national Syrian conservationists that protested against the implementation of the Banshoya master plan. The study, that managed to deter a full implementation of the master plan, ended in two successive UNESCO reports. On the one hand, the reports condemned the master plan for its indistinction between the traditional city center with its pedestrian character and the new business district which depended upon vehicular traffic, on the other hand, they warned against high rise construction in direct proximity to the west of the historic nucleus (at Bab al-Faraj).

According to the planners, the construction of high-rise towers in direct proximity to the old center would generate too much heavy traffic as to be absorbed by the road network originally intended to serve as feeder streets for the old town, they foresaw a fatal struggle between the old city and the new center: The presence of the historic fabric will obstruct the growth of the new center, and the old town will lose its viability because of the growing impact of modern structure. They called for finding the right interrelation between the old town and the new center by combining conservation goals with development factors. They acknowledged the need for the old town to receive enough energy in order to remain viable and alive, but they stressed the need to protect the old city against an overdose of activities, which would destroy its fragile texture [Gangler 2000].

• First Recommendations
In brief, they recommended:
- to control, select and adapt the vehicular traffic flow entering

Before

After

the old city by providing various degrees of accessibility (filtering, distributing, diluting and adapting to respect the specific constraints of the old city), today almost 30 years later, these recommendations haven't lost any validity

- to improve existing ring roads and make maximum use of them as protective devices for shielding the old town, transfer through traffic approaching the old city by establishing a "barrier" to channel west-east traffic flow into north-south arterials and by guiding it into a tangential direction, leading up to the loops of the ring roads

New highrise blocks (existing and proposed)

New roads cut through the fabric

Interior courtyards

Traditional pedestrian paths

Fig. 3- 11 (far left) Farafra quarter north of the great mosque before (above) and after (below) demolitions occuring since 1954
(source: UNESCO Report by Bianca et al. 1980)

Fig. 3- 12 (middle): Bird's eye view of Abdel Mun'im Riad Street (north of the round about) that was cut into the historic fabric

Fig. 3- 13 Aerial view showing the difference in scale between historic and modern structures along the new streets
 (source: Google Earth)
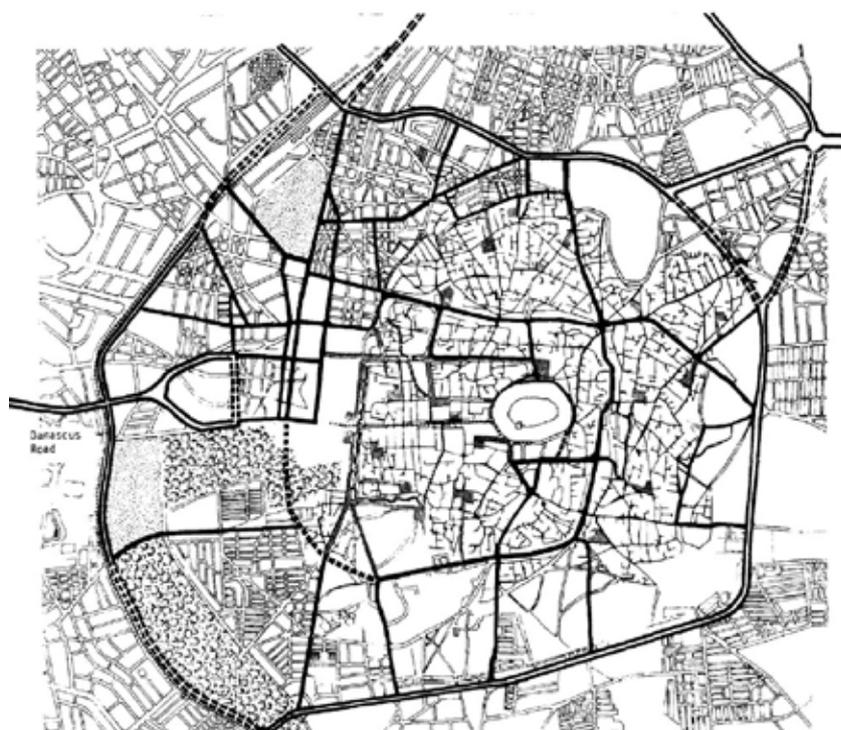
Existing ringroad sections

Proposed new sections

Existing major road network

Proposed new sections

Local streets serving the old city

Main pedestrian connections

Fig. 3- 14 Traffic scheme proposed by experts in 1980 to ease circulation around the old city
(source: UNESCO Report by Bianca et al. 1980)

Fig. 3- 15 Figure ground plan of the central area of Aleppo city showing the historic street pattern of the *medina* in contrast to the surrounding modern street patterns
(source: Gangler 2000, p. 91)

- to shift the center of gravity of the new town from Bab al-Faraj, so as to avoid conflicts and to offer a larger develop ment potential to the new city center

- to articulate transition zones and "filters" between the new central area and the pedestrian area of the old town, introduce a series of buffer spaces which will allow for filtering the impact of circulation and minimize pressures on the old fabric

-to reorganize and/ or relocate the activities of the central area according to their requirements in terms of space and vehicular access
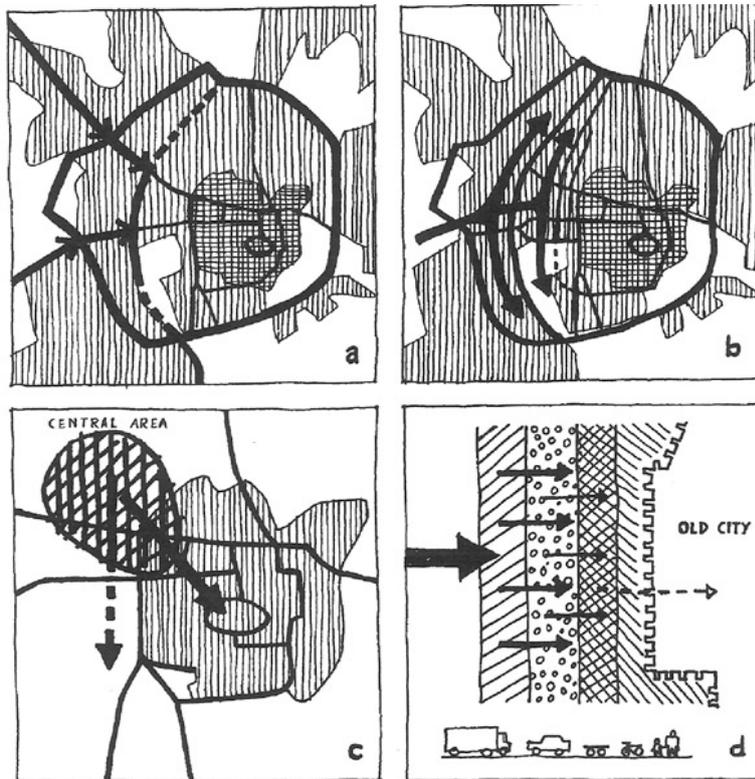
Fig. 3- 16 Proposed land use west of the old city that would ensure a filtered transition from the historic center to the new city extensions in 1980
(source: UNESCO Report by Bianca et al. 1980)

- create well-balanced points of access to the old town from the periphery, distribute the entries in such a way as to achieve an equilibrium in "irrigating" the old fabric

3.1.4 The Socio-Economic Transformation

The modernization process that accompanied the introduction of horse-drawn carriages and railway lines and the establishment of European-style businesses and dwellings towards the end of the 19th century, had obvious repercussions on the old city; not only did it affect its social equilibrium, but it also affected its economic structure. The old city had started to adjust to the changes taking place; hence the upper floors of the *khans*, now emptied from their European occupants, were soon transformed by the native traders and entrepreneurs into workshops and small production entities. Their efforts had been additionally helped by the arrival of the new industrial machines from Europe. Now many *khans* housed weaving machines and spinners in the upper floors, while offices and deliver counters of wholesalers occupied first stories. Over time these production entities grew in importance and number, and as the master plans introduced the car right into the heart of the old city, with time these entities started also to be dependent on motorized deliveries.

Among the most influential factors contributing to the exodus of the original residents from the old city were the above-mentioned modernization practices that introduced incompatible scale in form of tall buildings and wide streets and eventually led to the deterioration of the city's infrastructure and threatened the privacy of the residential enclaves and barred sunshine and

Fig. 3- 18 Men sitting at the threshold of their workshop working and socializing at the copper market in old Aleppo

Fig. 3- 19 One of many entrances to the covered souk that extends aroundf 12 km

Fig. 3- 20 Workshops and small production entities are spread all over the historic center

cool air that ventilate the houses around them.

Many middle and upper-class residents were enticed to move, during the mandate times, from their traditional homes in the Old City to the new suburbs where more modern amenities awaited them. Their old houses were rented out or sold, after subdividing them into smaller units, mainly to migrants from the rural hinterland but also to poorer segments of the Aleppo population. Other houses were used for industrial workshops or as warehouses.

Another factor was the increasing demand on housing in the aftermath of the second wave of modernization under Hafez al-Assad, due to the rapid population growth caused by immigration waves from the countryside and from smaller cities into Aleppo. The pressure for modern housing in the new quarters augmented even among the moderate and low-income classes. This contributed to the second wave of exodus from the old city.

Between 1981 and 1998 the number of inhabitants decreased from 149,253 to 109,253, this went hand in hand with social changes reflected among others in moving away from the "extended family" model to the "nuclear" one. Young families, when attaining sufficient financial capacity, tend to escape the confines of their extended family's control in the old city to live instead independently in serviced neighborhoods, in apartments with modern easy-to-clean bathrooms and kitchens. Deterioration of the quality of living was also linked to the extending industrial activities which brought about more traffic congestion to the old city, and further strained its poor technical infrastructure.

The city structure and the population distribution has transformed from one based on ethnic, religious, geographic and professional affiliations to become dependent on income and social class.

Present Situation

Aleppo old city is home to 109,253 inhabitants, 40000 of which are employed, 28000 commute outside the old city whereas 20,000 commute into it. Since it receives 40,000 visitors each day, its daily population can be estimated at 141,000 on average [Planco Consulting & DOC 2003].

Despite the waves of exodus, today the old city offers approx. 30,000 workplaces and is still maintaining a very important economic function, in fact it is still the heart of the private sector economy of Aleppo [Planco Consulting & DOC 2003] and although the "new city" developed rapidly next to the historic one, it didn't manage to cater for sufficient administrative and commercial establishments in good time [Qudsi 2000]. So the old city in which administrative functions were introduced as far as the late Ottoman period, has served as the main "city center", the heart of the private sector economy and the place of trade for the whole agglomeration of 2 million.

Commercial and producing activities are scattered all over the old city and their activities are miscellaneous. The main souk, with its surrounding small scale processing enterprises, became the center of the business world, thus remaining the focal point for the rural districts surrounding the city to this day. This also entailed the expansion of the services that with time required more space but also attracted more traffic with it leading to a more congested city center [Gangler & Esefeld 2007].

Similarly, the administrative buildings located in the old city operate on the governorate level as a whole, and the users of these buildings are the main contributors to the peak-hours occurring daily between 12 and 2.00 pm.

Generally it can be stated that the customers of the old city and especially of the main souk mainly come from the rural areas in the vicinity of Aleppo and from the old city itself. They are mostly traditionally oriented, and belong to the lower income bracket, thus 60% of the retail stores in the old souks are devoted to women's fashion & jewellery, especially for women who prefer conservative fashion, on the other hand, men of rural origins dominate another large portion of the souk, and it seems like the souks have lost a considerable part of their non-Muslim clientele but this is somehow compensated by the presence of tourists (Arabs and Westerners) [David 2002].

Fig. 3- 21 Economic vitality of the souks is dependend on goods deliveries that occur mainly by small Suzukies and hand carts

Despite the liveliness of the souks of old Aleppo, testifying to their economic interest, their image underwent a partial depreciation since the range of products offered does no longer cover the needs of all citizens especially those of upper classes looking for western designer brands and modern gadgets, and chic cafes (that are available in the "new city" after opening up the economy to foreign trade), but has become limited to particular user groups, so somehow it stopped being the main trade center for all, nor is it the main public space for all strata where people used to manifest their Aleppine identity [David 2002].

In addition to this are matters of hygiene, the way businesses are run and managed, e.g. soap factories, the use of the same production methods that have been used for a hundred years now and the same shabby premises, which can all be viewed by some as outdated, lacking in innovation, not corresponding to worldly standards and run by unprosperous people lacking in entrepreneurial spirit (many trades are handed down through generations) not able to make a turnover because they seem not to respond to today's standards and the middle class's needs [Bauer 2009].

The covered souks "*Aswaq al-Madina*" in turn, continue to be not only a vibrant place that offers goods clustered according to their speciality as it has been in the past, as it is also traditionally a place where things are being fabricated so one can find the spices and herbs market, the scents' market, the gold market, women's market, etc. and around the corner craftsmen are still at work in their workshops or in the khans: the silversmiths, coppersmiths, tanners, weavers, tailors, shoemakers and food traders together in a maze of continuous covered alleyways that extend almost 12 km. The souk's roofs are covered with a layer of lead that keeps it cool in summer and warm in winter with a little natural lighting at times coming from small openings in them.

Nevertheless, Aleppines belonging to the middle and upperclasses rarely come to the old city, this is revealed through interviews showing that the main users of the old city are limited to the elderly original residents that stayed behind while their children have moved out, the poor societal class, farmers and visitors from the surrounding villages and tourists (Arab and international). The reason for this avoidance is obviously because they cannot come here with their private cars, because they are afraid of their cars getting scratched or harmed or because of the traffic congestion, dirt or simply because they don't know where to park; even the touristic map of Aleppo doesn't have the public parking facilities marked on it, the locations of gas stations on the other hand are given.

Another mentioned reason is that living in the old city is regarded by these social classes as troublesome and too difficult (despite the rehabilitation efforts) in the minds of Aleppines, it is still lacking in prestige, poor and dirty and not "modern". Interestingly, high society women dismiss the old city as they find its paving inappropriate for high-heels! [Bauer 2009].

All in all, the depreciation of residential neighborhoods is the handicap of the *medina* today, and the reluctance of private investors to invest in the renovation of *medina* houses is mainly connected with the additional costs that such actions entail when compared to houses in other urban areas, which has to do with the nature of historic buildings and their materials, whereas non-accessibility of the *medina* by car is another main issue of concern to investors [Tagemouati 2010].

3.1.5 Traffic and Circulation Problems in the Central Area
• The Situation in General

As described earlier, the old city's new role as Aleppo's central business district has meant an increase in the level of traffic and environmental pollution, which puts huge pressure on its historic fabric. Its additive structure with a hierarchy of narrow streets and dead-end alleys, its active social and commercial lifestyles, makes accessibility by car and delivery vehicles difficult; the city's urban structure cannot accommodate the ever-increasing individual car traffic, as in the case of the new built up areas around the city.

Despite the authorities' (municipality, traffic administration) efforts to ease the situation, the problems have seemed to only get worse. This failure can be explained by a combination of things: the growth of the commercial activities in the center, the concentration of the central commercial and administrative services in the old city, public policies encouraging mass motorization, the lack of a proper transit system, deterioration of the service quality in public transport leading to uncontrolled urban sprawl and increasing car dependency, a constant increase in demand for travel closely linked to suburbanization and the uncoupling of home from work, all causing widespread congestion along the main thoroughfares inside and outside the old city, leading in turn to bottlenecks and a huge drop in travel speeds.

Also, the inability to develop the complex institutional, financial and technical tools needed for the management of *medina* patrimony and, last but not least, the general ambivalence to traffic
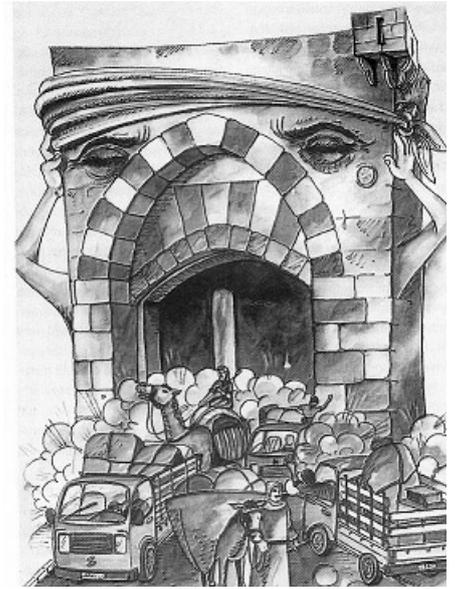
Fig. 3- 22 Traffic congestion and chaos at the old city gate of Bab Qinnisreen which was opened to vehicular traffic as potrayed on the brochures distributed to residents of the old city as part of an awareness campaign aiming at explaining the necessity for traffic management in the area
(source: GTZ)

Fig. 3- 23 Delivery cars driving produce fumes, cause vibrations and threaten the physical structure of buildings aligning the narrow *medina* streets

rules and regulations and service hours.

Regardless of the first warnings by planners of the specificity of the old city's urban structure and their recommendations, car accessibility to the old center has been totally unconstrained, only in the narrowest streets of the residential quarters have cars been absent; other parts have managed to deter vehicular traffic especially taxis due to the bad state of their roadways, leading to discrepancies in accessibility, and residents feeling discriminated. Conventional traffic planning approaches that are car-oriented continue to be adopted by the authorities in charge, for instance in 2009 the head of the traffic department in Aleppo expressed that street widening and the redevelopment of squares and public gardens into multi-story parking facilities with the help of private investment was seen by him as major solutions to the traffic congestion, for him streets, especially main streets were for the "rolling of cars" [Jum'a 2009]. Although most external traffic has business in the old city, a big portion is through traffic without having any interest inside the old city (mainly targeting the eastern or southern city suburbs).

The pure residential quarters that surround the old city also depend on the center for shopping; people drive into the city centre or through it for shopping or to their jobs.

• **Vehicular Traffic**

Traffic jams during peak hours have been the norm, lack of traffic signs, demarcated lanes and painted arrows defining traffic directions, all have led to chaotic driving conditions. Some traffic lights have been mounted without sufficient study for their site. They often operate on fixed programs, and they are not coordinated. They often also have negative influence on vehicular traffic and no clear organization of traffic inside the neighborhoods exists. The narrow local streets are used chaotically since some can accommodate cars, while others cannot. They are often used in both directions causing traffic congestion on various streets of Aleppo jams and quarrels among drivers. Their paving is in bad shape, since they are covered with cobblestone that isn't made for use by cars.

Pressure ignited by the ever-increasing number of cars moving through the old city's streets clog the narrow streets that also have parked cars along them and are risky for pedestrians. The high rates of air-pollution from car and truck fumes that move in very close proximity to the buildings, not only dirty the buildings' façades, but are also a threat to the physical condition of the bordering buildings caused by vibrations [Driessen 2004]. This, coupled by people's lack of awareness and indifferent attitudes towards traffic regulations and delivery times, has exerted heavy pressure on the old center. High traffic volumes have been concentrated in the city and around it leading to an unbearable sitution [Jansen 2000].

In the case of Aleppo and other Arabic cities, part of the problem is the lack of official bodies that would take on the responsibil-

Fig. 3- 24 Delivery car transporting goods from a storage place located in a residential neighborhoods

ity for the organization, control and implementation of the various traffic-related planning i.e. introduction of street hierarchies, defining traffic-free zones etc. Instead, many short-term measures are implemented without profound academic research or analyses. Holistic approaches, without the appropriate bodies, are doomed to fail. Aleppo governorate even occupied the top of the list in 2007 in the number of severe accidents that occurred within its limits.

• **Motorization Levels in Aleppo**

Motorization in the Aleppo agglomeration doesn't exceed 88 vehicles per 1000 inhabitants. Car ownership levels are even lower in the old city; where in most quarters only 5% to 10% of residents own cars and oftentimes many of the owned cars are used by the residents for their jobs (Taxis and delivery vehicles). Exceptions to the above are al-Farafra quarter and the new extensions of the old city in the north, where 35%-40% of residents own cars [Herrle et al. 2005]. This could be explained by the fact that historically, these quarters were inhabited by the most affluent people. Nonetheless, the number of cars has been following a constant growth curve in the last few years and it is anticipated to continue so, triggered by Syria's economic opening and the tax incentives given when purchasing new cars as part of the Syrian government's plan to exchange old cars (many up to 40 years old) with new less polluting cars.

Interestingly enough, even with those low levels of car ownership, public policies have mainly focused on catering to the needs of the automobile, and the negative impact of car usage upon the quality of life is most evident in the old city center, the part most congested with traffic in Aleppo.

• **Delivery Traffic**

The old city's economic specialization in the secondary sector demands a high frequency of deliveries.

These are usually performed by mid-sized pick-ups, especially the Suzuki type (which will from now on be referred to by the single word 'Suzukies') in some cases by pack animals especially donkeys (in some *medinas* still an important mode), large trucks and even larger trailer trucks.

There is a large number of processing entities in the old city.

Fig. 3- 25 & 3- 26 A boy transporting goods from a storage facility in a residential quarter- with a hand cart. As can be seen to the right, a storage space can be simply a middle-sized room

These are mainly small scale enterprises and family businesses, distributed all over the city, but mainly around the main souks. The raw materials needed by them for production, is delivered from outside, and the end-product is sold—to a great extent—outside the old city again. This holds especially true for ready-made garments, only a minor share remains in the old city for sale. This indicates that the old city as a location is mainly used for production by the secondary sector.

The retail and wholesale enterprises also get the major share of the commodities from outside the old city; the goods are stored in khans close to the main souk. From here they are delivered to the retailers.

The major problem for the processing industries is the current traffic situation. The narrow streets and the delivery occurring at all times of the day have been negatively affecting the city's urban environment. At the same time, *medinas* with no vehicular accessibility at all like Fes al-Bali, where freight is brought by motorized traffic only to the gates, and distribution within the walls depends on traditional methods — donkey or mule carts, handcarts or on the shoulders — is reported to induce additional costs for material flow and ultimately increases the costs of rehabilitation [Tagemouati 2010].

What further complicates the situation is the segmented way these enterprises produce, that is highly dependent on transport in between the production steps and consequently generates even more traffic [Planco Consulting & DOC 2003].

There are two types of transportation facilities in the old city, cargo facilities and storage facilities:

Cargo Facilities:
There are around 20 facilities mainly concentrated on the main axis of al-Moutanabi street and in the Safsafeh neighborhood, especially in the area surrounding the police station of Bab al-Nayrab. They are specialized in shipping merchandise from and into the *medina* and thus are attraction points for large vehicles (closed mid-sized vans, large size trucks, and even large trailer trucks) with long parking durations. The mere fact that large trucks are allowed to enter the *medina* and the non-existence of any regulations of these facilities by the authorities and the extended parking duration (mostly on-street, as there are no designated spaces) has led to increased traffic loads.

Storage, Loading & Unloading:
These facilities store goods for retail stores and industrial workshops, others store raw materials for small production plants or products of local manufacturing before shipping them to other parts of town or other cities. They are around 262 [Planco Consulting & DOC 2003], and they are concentrated on the eastern side of the axis leading from Maysaloun, Bab al-Hadeed, Job al-Qobbah into Bab al-Nayrab. They exist also in al-Tellal Street, al-Jedaideh, Bab al-Naser, and around the main souk.
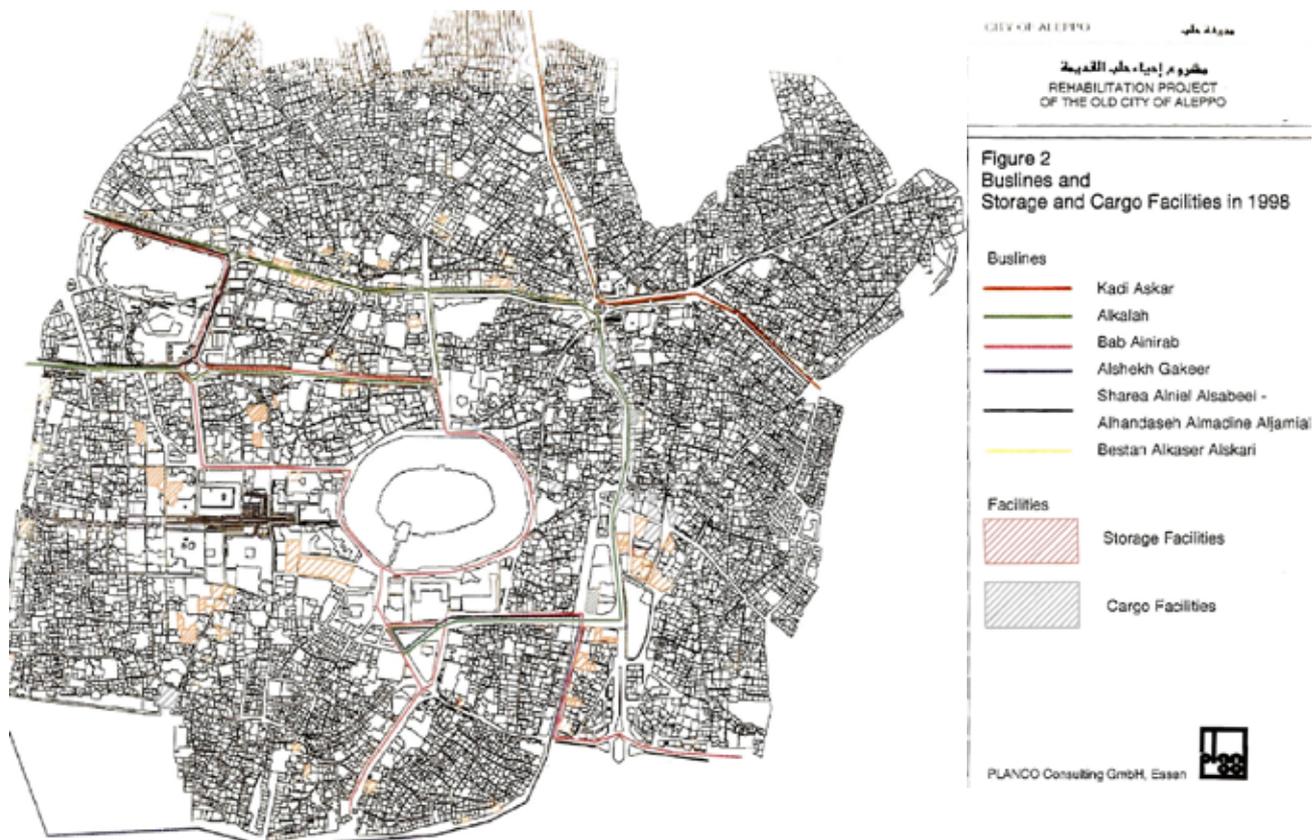
Fig. 3- 27 Locations of cargo and storage facilities in historic Aleppo
(source: Planco consulting 1998)

• Pedestrian and Cycle Traffic

So far, the authorities in Arabic cities have not paid much attention to the management of pedestrian traffic and none to cycling as their main focus has been to cater to the automobile. When any kind of initiatives aiming at enhancing the pedestrian environment were undertaken, they were usually linked to tourism and translated into drawing up touristic trails or pedestrianizing individual streets with highest patrimonial value. This policy neglect can be simply explained by the prevailing attitude towards non-motorized modes which are seen to be synonymous with poverty and backwardness and inferior to the car, a symbol of success. This has resulted in a total absence of pedestrian facilities and in a diminishing role for both walking and cycling.

The environment of the *medina* with active social and commer-

Fig. 3- 28 Absence of appropraite infrastructure for pedestrians and cyclists compells users to force their way through traffic and risk their lives

Fig. 3- 29 Pedestrians in Arabic cities have been marginalized as planning efforts have been solely concerned with catering to the automobile, Sijin Street in Aleppo before redevelopment
(source: courtesy of DOC)

cial lifestyle is ill-equipped to deal with motorized traffic; sufficient road space doesn't exist in the tight, compact urban fabric to accommodate vehicular traffic that invades its spaces and marginalizes pedestrians, its original users.

Streets are dangerous, full of fumes and noise with constant conflicts between pedestrian accessibility and vehicular accessibility. The situation has been especially acute along the main streets and traffic nodes, where not even standard pedestrian crossings exist, often sidewalks are also very narrow, which forces people into the driveway. Most traffic lights, if available, lack pedestrian crossing signals [Jansen et al. 1998]. Usually medians that separate traffic directions are built-up and are too high and narrow; no appropriate interruptions for pedestrians have been foreseen. The situation is better on internal axes inside the residential neighborhoods.

All these factors have led to an unacceptable rise in the number of accidents and traffic infringements, most accidents being mainly caused by high speeds, and by random-crossings of pedestrians at points not specified for that purpose. [Jumaa 2009]

• **Stationary Traffic**

Provision of parking spaces in the city center is a difficult task due to the city's nature and opposing interests: On the one hand there is the city's sensitive and tight urban structure that has no "spare space" for parked cars, on the other hand the city's role as a vital economic centre is also dependent on supply traffic and customers. What is clear in Aleppo is the lack of appropriate parking facilities and the absence of a parking management system that would ease the situation.

This has always been a major topic in the historic city; merchants believe that the difficulty in finding parking spaces in front of their stores has been responsible for the loss of a considerable part of their clientele, especially customers coming from new Aleppo. These people that "avoid" the historic center are only interested in particular merchandise, so they like to drive, park quickly in front of the store concerned, and drive away.

Parking in the central area despite narrowness has been mostly on-street; parked cars dominate the streetscapes and invade smaller squares. Although some underground parking garages were constructed under several new buildings like on Mutanabbi Street and Antakia street, they are underutilized, in poor condition and don't fulfill modern standards of hygiene and organization.

Illegally-parked vehicles on narrow streets that are at times used in two-directions further exacerbate the situation and create traffic paralyses. According to the consultants, what renders the situation even more acute, is the lack of parking regulations and the dysfunctional "building code" of the city which does not specify parking lots or underground parking structures.

Since 1998, there has been a move towards banning the parking of cars along certain major axes and some directives have called for establishing new parking spaces and multi-level parking

structures, but besides introducing metered parking along some streets, plans of building multi-level parking facilities have remained on paper.

Number of Parking Spaces for Residential Households
In elaborating the traffic plan for the old city, the traffic group made estimations of the number of parking spaces needed to serve the old city, the estimation has been made according to a "predict and provide" model based on a rough prediction that in 2010 one in every five households (with approx. 8 inhabitants) will own a car and thus need a parking space, whereas in 2020 the number will increase and the group estimated that every third household will own a car.

• Public Transportation Service
The urban structure of the old city's neighborhoods, whose streets, some only two-meters-wide, require alternative means of transportation to mere standard buses.

Up to the present, the main means for public transportation in Aleppo have been buses and micro-buses. Before the intervention, most buses circulated on the perimeter of the old city, whereas nine lines traveled through it. Despite this, various residential and mixed-use areas intra- and extra-muros did not have direct access to public transportation, e.g. the Jedaideh quarter among others, was not served, which led to the dissatisfaction of residents, who felt discriminated against. People living or working in these areas had to walk a distance of more than 1 km to catch a bus or micro-bus.

Since micro-buses were inexpensive and more flexible than buses, they became the most used system to access the old city. However, they operated only on profitable lines and they had no obligation to serve their designated routes. Also, they did not adhere to their designated stops or to safety standards, especially when they added extra seats and raced to pick passengers.

The fleet of public buses, on the other hand, was insufficient, buses did not enjoy priority and had no designated lanes so they were often delayed whereas bus stops were usually occupied by illegally parked cars forcing buses/minibuses to stop in the normal driveway instead, in addition waiting times and queues at bus stations were too long, especially at rush hours.

All this rendered buses unreliable and led people to favor pr-ivate micro-buses instead, especially since bus and micro-bus routes overlapped. At the same time, private micro-buses did not serve the internal areas of the old center's neighborhoods thus they couldn't play a complementary role for the public buses, hence the system was defunct.. Due to the above described shortcomings in the state public transportation, informal transport, collective taxis and minibuses have proven to be the main players in urban transport again and again. In 1998, there were 32 buses serving the old city, compared with 605 micro-buses, whereas the number of taxis operating inside the city is not known, but within the governorate the total number of operating cabs was

7603.
Built on private investment and as a major creator of jobs, public transportation constitutes a crucially important socio-economic sector. These circumstances have rendered coordination between operators more complex and hampered the introduction of integrated transport provision within the cities.

• Waste Collection
Adequate waste collection is a specific challenge for Arabic historic cities in general. Narrow streets and sometimes difficult topographical conditions usually not only hamper the use of big equipment to collect the waste but also restrict the allocation of waste containers inside the historic areas. The hot climate requires daily collection of domestic waste. According to the planners, awareness for environmental issues is generally not well developed in Arabic cities. Socio-cultural attitudes and habits with regard to garbage are specific and require adequate procedures to ensure cooperation from inhabitants. In Aleppo, problems arise as the households and the commercial facilities do not provide own containers or bins to collect and store the waste temporarily. The waste is dumped daily in the street either in plastic bags or even without any container. Commercial waste is usually mixed with domestic waste and transported by trucks to the waste dumping sites without any protective measures. Only in rare cases, commercial facilities have sometimes specific arrangements with private entities to collect their waste, e.g. glass, textile, metals etc., often parts of the waste are sold for recycling purposes [Jansen &Tabor 2006].

The equipment used in the old city of Aleppo has also been used for other parts of the city and is therefore insufficient to fulfill the requirements. The habits of the inhabitants and the commercial facilities, together with the working time of public services, exacerbated the problem with the result that the alleys and streets were littered with garbage. This had a negative impact not only on the living conditions in the old city, but also on the attractiveness of the center for tourism and business activities.
The planners noticed that the quantity of collected waste has remained the same for seven years, according to the persons in charge.

The Previous Collection System
Waste collection and management in Aleppo has been the task of the department of cleanliness in the municipality of Aleppo.
The regular method of sweeping the streets and collecting the waste was similar in all areas, each distrcit had a number of workers and each worker had an area he was in charge of. The tasks carried out by the worker included the following: sweeping the streets and alleys, collecting waste from the fronts of houses (the residents delivered the waste during the night before the arrival of the worker), collecting waste from the front of commercial stores and small facilities and then transporting the waste
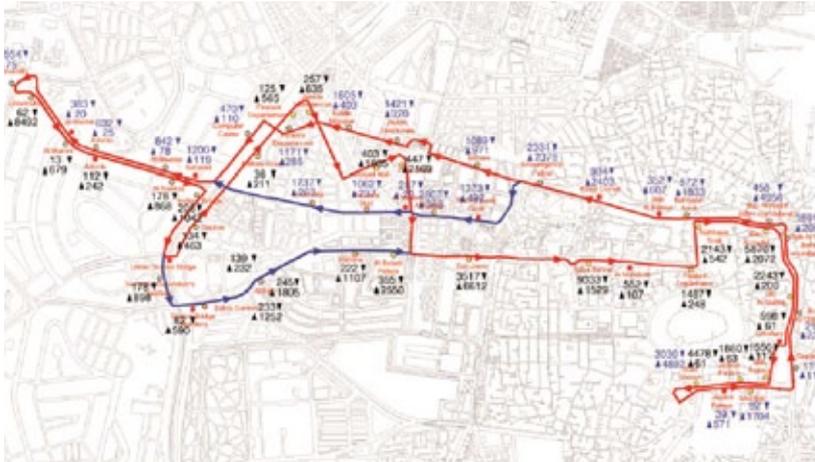
either to a waiting van or emptying it in the nearest container. Each area had a number of small or big containers placed in the main and wide streets. Also, each area had either a van with regular stops or a continuously moving van on a determined route. Workers could easily signal the vans to stop in order to evacuate their load of solid waste. There were two different shifts: the morning shift that started in all parts of the old city at 6:00 AM. and the afternoon shift that concentrated on main axes and included emptying the containers and cleaning the most important public spaces starting at 14:00 and ending at 21:00.

The efficiency of this system was relatively low because of the difficulties to transfer the waste from pushcarts or tricycles to the trucks. Most of the trucks were not equipped with cable lifters and the pushcart bins, as well as the containers of the tricycles, were not designed to be lifted by the cable car.

• Road System and Functional Hierarchy

There are two ring roads, one intramuros surrounding the old city (Hawl al Madineh, literally: around the city) and an outer bypass encloses a wider circumference around the inner city. Parts of the main ring road provide a dual carriageway with two lanes in either direction and junctions at ground level with roundabouts.

Before any intervention, most congestion was concentrated within the enclosure of the main ring road and between the old city and the new business center to the west at Bab-al-Faraj. Until recently it was mainly tackled by traffic signal control at junctions, operating on a fixed-time control without coordination and by one-way streets.

No hierarchy of streets has been evident except between minor access roads and other routes (the traditional street pattern). In old Aleppo, the souks' pedestrian streets extend 12 km, whereas the rest of the streets and alleyways extend 300 km.

The traffic team has differentiated between two types of streets:
 - Modern, asphalt paved thoroughfares which were cut
   through the traditional fabric
 - Traditional streets with cobblestone paving: these are the majority of local street axes and vary in quality from good and renovated to below average. Usually they are in good condit-
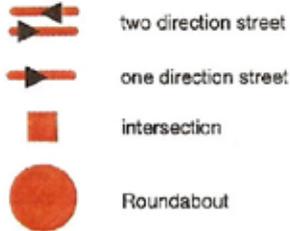
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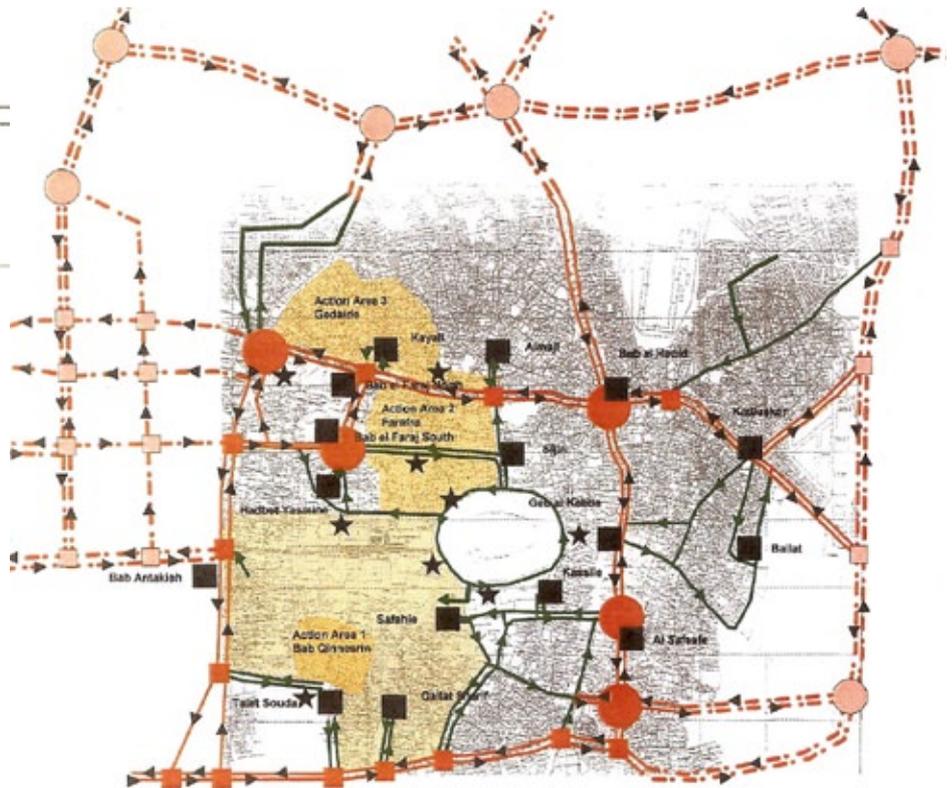
ion if they are restricted to pedestrian use and below average if they are used by vehicles as well. The streets of the historic fabric vary in width, some can accommodate vehicular traffic. Where no formal traffic organization has taken place, the interrior axes are used chaotically.

Regional Context:
 In general, the traffic patterns and movements can be categorized into three levels:
- Regional traffic that enters the historic site just to pass through it (through-traffic) in a west-east direction and another in a north-south direction
- The distributive traffic which enters and ends in the old city area, mainly from the new city suburbs, but also from the surrounding residential neighborhoods; the study area generates and attracts a large percentage of traffic locally because it is an important retail, wholesale, administrative and a tourist attraction centre
- Internal Traffic: Origin and destination of trips are within the old city boundaries

• **Modal Split**
The predominant transportation mode in Aleppo is the motor vehicle exemplified by taxis who serve mainly commuters and tourists, and the private car. Other modes include microbuses and less often buses. The available data doesn't include the share of walking.
Two-stroke Suzuki minivans are the main transport mode for goods both into and outside the old city, they are favored for

their size and ease of maneuvering in the narrow alleys, despite the fact that they are loud and air-polluting. Other delivery vehicles include cars, followed by pickups, and lastly by trucks [Driessen 2004].

Before any traffic regulations were introduced, most employees were using buses, micro-buses and Taxis to reach their jobs, a smaller portion were using their private cars, and even a smaller percentage were walking, (which is noteworthy since the number of old city residents working in the *medina* itself is around 12000). State employees were mainly using their state-owned vehicles; however, this number was limited.

• **Land Use**
Existing land uses can be divided into the following categories:
- Residential   (i)
- Commercial   (ii)
- Industrial   (iii)
- Tourism-related   (iv)
- Administrative   (v)

Residential:
The residential function makes up a good part of the historic city and residential densities despite exodus trends can still be considered high. It is still possible in Aleppo to find "pure" residential areas, not invaded by tourism facilities as is the case in other *medinas*. The biggest threat comes from the commercial activities near the central souks. The biggest concentration of residential quarters can be found in the eastern part of the old city. Residents of the *medina* primarily seek basic services such as health and education, shop at the local markets and grocery stores, congregate at the local mosques and related facilities, sip coffee and tea at cafes (men's main place for social interaction), younger generations on the other hand seek cinemas, theaters, gaming halls and community centers.

Commercial:
The main social and commercial activities in the historic center are mostly centered on the main souk spine in the area left to the citadel and around the Big Mosque (al-Masjid al-Umawi),
The other main area with augmented commercial and public spaces and therefore big traffic generating activities is the area west of the historic city around Bab al Faraj. Here a bus station and services related to travelling remain the dominant elements, other services that are distributed within an array of a couple hundred meters include most of the hotels, a terminal for regional and international buses, taxis and regional microbuses (two have been relocated elsewhere), travel and airline agencies, the central bank, the archaeological museum, most of restaurants, cafés and cinemas, in addition to many establishments serving the automobile (mechanics and parts' shops) [David 2002].
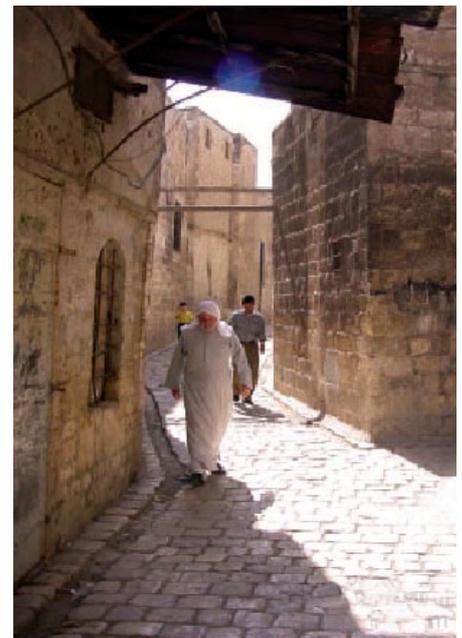
Fig. 3- 32 A traditional alleyway with cobblestone paving
(source: GTZ)

Fig. 3- 33 Stepped street north of the main souk

Traditional Souks
Open Spaces
Mixed Commercial
Residential Area
Administrative Buildings
Tourism-Related
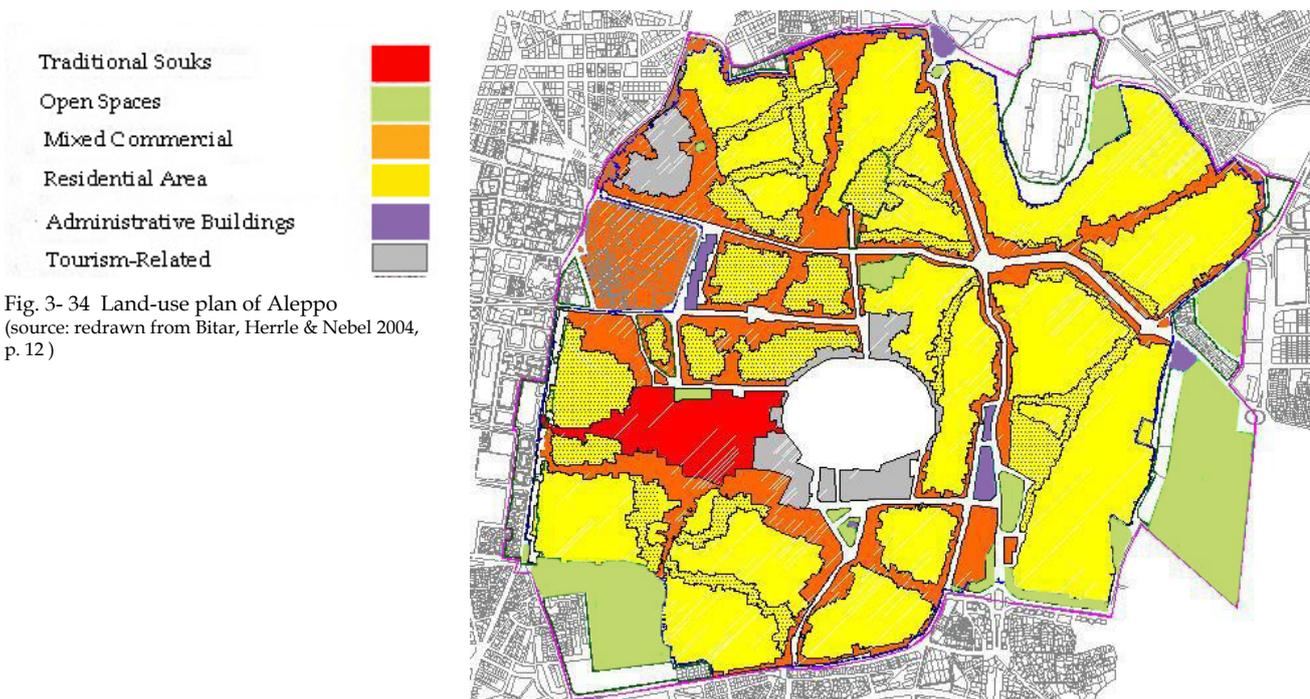
Fig. 3- 34 Land-use plan of Aleppo
(source: redrawn from Bitar, Herrle & Nebel 2004,
p. 12)

Industrial:

There is a large number of processing entities in the old city, most-ly related to textile business especially around the main souk, they are mainly small to medium scale enterprises and family businesses, and their number has increased during the last few years. This segmented kind of production requires numerous trips in between the production steps and is a main traffic gen-erator. Although many of the larger production entities moved out of the old city to industrial sites in the new town, enticed by tax exemptions provided by the state, they still keep their head offices inside the old city.

Besides the textile and leather businesses, metal and goldsmith represent a large share followed by soap production. Cargo fa-cilities and warehouses constitute another industry-related land use, they are scattered around most of the old city, most impor-tant of which is located in the area west of the main souk, and others receive goods from outside the country with limited rela-tions to the old city enterprises, and hence, should be relocated [Planco Consulting & DOC 2003].

Tourism-related:

The much higher consumption potential of foreign visitors makes activities aimed at that user group clearly the most lucrative ones but it could at the same time present a new threat to the residen-tial function if left uncontrolled.

In addition to monuments, museums and galleries, international and national tourists seek upscale restaurants and cafés, boutique hotels, shops with local handicrafts, souvenirs and local fashion, produce of local workshops, whereas visitors from the urban agglomeration usually seek traditional foodstuffs and items. In Aleppo some upscale restaurants and boutique hotels have started to spread especially in the Christian-dominated northern

residential extensions, this subtle process of gentrification has begun since the rehabilitation of these quarters was completed. This also has led some former residents to return to live in those quarters.

<u>Monuments & Religious Buildings</u>
The concentration of historic monuments in one area makes this area a big traffic attractor, although the city as a whole is a monument and a UNESCO heritage site, there are still areas where the concentration of touristic attractions is bigger than others. The traditional souks is one such area with the Friday Mosque, al-Masjid al Umawi and the Citadel

Administrative
 Governmental institutions are primarily focused in the southern perimeter of the citadel except for the Palace of Justice, the emigration office and the municipality administration that have been recently moved to the new central district and replaced with touristic amenities.

• Traffic & Urban Transportation Policies and Approaches in the Old City towards Improving Urban Transportation

In the following, the most important approaches to solve the traffic problems, adopted by the traffic team, as part of the project for the rehabilitation of the old city of Aleppo, will be briefly explained, the focus will be more on propositions and interventions on the city level, whereas their interventions at the quarter level will be later presented with the examples of the Jalloum and Jedaideh quarters.

General Traffic Policies in the Old City
After Aleppo was recognized by UNESCO as an "endangered historic city with a universal heritage to be cherished and saved", a project for the old city rehabilitation was started in 1993 in collaboration with the German Agency for Technical Cooperation (GTZ). It has aimed at improving the living conditions of *medina* inhabitants and reducing the neighborhoods' degradation.
"Transportation and mobility planning" was part of the "infrastructure upgrading planning" for the *medina*. It comprised the design and execution of new infrastructure networks, traffic and transport management planning and increasing the competence of the technical staff.
In Syria the city council is organized in different departments according to utilities, e.g. water authority, wastewater authority, electricity, transportation department and so on. This administrative structure stood in the way of easy coordination. The program of implementing infrastructure upgrading in old Aleppo combined the activities of sewerage, telephone, traffic and water services in one work team, which has produced better coordination and integration between various institutions.
Later it was decided to establish the Directorate of the Old City

(DOC) within the municipality that would deal with all issues, related to the old city limits among them traffic.

A private traffic consultancy group, namely Planco Consulting GmbH, also from Germany, headed by Dr. Georg Jansen has been appointed to cooperate with the Directorate of the Old City. The team produced a thorough study, and also elaborated on individual traffic plans for three selected "Action Areas".

The first report issued by Planco Consulting in 1998 showed that the planners considered the previous traffic studies and proposals made for the *medina,* and accordingly, some previous but unimplemented recommendations were taken into account and amended in the new plan, whereas others were dismissed for their invalidity.

Previous Proposals for the Traffic Problems in the Old City:
- Professor Doumairi, for example, based his plan on the division of streets into major and secondary streets
- Another plan was elaborated by UNESCO in 1983 for all Aleppo including its historic center

Among the propositions that have been adopted were Professor Doumairi's division of streets into major streets with two directions and secondary streets as one way streets, Planco Group suggested some amendments to his proposal:

The New Traffic Concept of 1998
In general, efforts to manage traffic in the old city were concerted and concentrated on the following objectives:

- Determine main and secondary streets, set clear traffic signals to indicate this, deter through-traffic that crossed the old city from north to south and east to west by concentrating it on main axes and, accordingly, protect the residential neighborhoods from it also by changing the direction of some streets
- Concentrate traffic on major roads and secure the traffic flow of the streets providing access to the old center by prohibiting parking along those streets
- Establish sufficient (long-term) parking spaces near the main entrances that give access to the different historic districts, residential neighborhoods and touristic attractions to serve the residents, tourists and shop owners
- Establish a system of parking fees for short as well as long-term parking
- Access for private vehicles to the pedestrian zones and districts should be prohibited with the exception of emergency vehicles (doctors, police, fire brigades and the disabled)
- Limit the time in which transport vehicles can enter the city centre (to the warehouses and shops) and limit it to certain hours during the day
- Access to and within all pedestrian zones should be guaranteed for disabled people, home supply, garbage collectors through one-way street systems
- Routes for bicycles should be considered

- Provision of enough parking spaces for every newly erected building
- Facilitate pedestrian traffic, by means of a pedestrian network covering the neighborhoods inside the old city, but also giving access to all major touristic attractions. Proper pedestrian crossings at intersections as well as addition of pedestrian signs and traffic lights.

The New Traffic Concept of 2003
The traffic concept of 1998 was followed by another subject plan in 2002 which was again updated in 2003, also produced by Planco Consulting. It aimed at complementing the previous procedures and "Action Plans" at the quarter level as it was realized that traffic planning cannot be successful if an overall concept of the traffic system was not produced (network and management) for the entire old city and its immediate surroundings. This took place by conducting additional traffic and transportation censes and surveys, including surveys of public transportation facilities and passengers of both private and public (bus) transport, examining their origins and destinations, trip frequencies and purposes, surveying transportation terminals and centers inside and around the old city, also interviewing the small business enterprises about their requirements concerning good transport. This was followed by measurement of the velocity of traffic flows in selected streets of the old city, and the impact of traffic volumes on speed, which was developed into a form of geographical information system. The area around Aleppo, as well as the city of Aleppo outside the historic city, have roughly been divided into different traffic regions whereas inside the old city itself more than 18 cells have been determined as origins or destinations of traffic demand oriented towards the old city. Using the calibrated traffic assignment, the traffic between these cells could be estimated for individual and public transport.

The subject plan from 2002 studies different alternatives and compares two proposed scenarios from which one was finally chosen as the "winner solution". Both scenarios adhere to the same basic principles, they aim to avoid transit traffic in north-south and east-west direction, ensure accessibility of the old city by appropriate bus lines of public transportation, provide parking facilities for private cars, control the operation of taxis and micro-buses by providing taxi stations and micro-bus stops in a way not to hamper the traffic flows, and finally to reduce traffic around the citadel and keep motorized traffic and pedestrian traffic separated as much as possible in the central and tourist areas [Jansen & Tabor 2002].
The two proposed concepts differed significantly in aspects concerning the location of parking facilities and the regulation of traffic flows. In both solutions deterring transit traffic away from the neighborhoods would lead to considerable increases of traffic loads on the ring road, consequently traffic speeds would become very low.
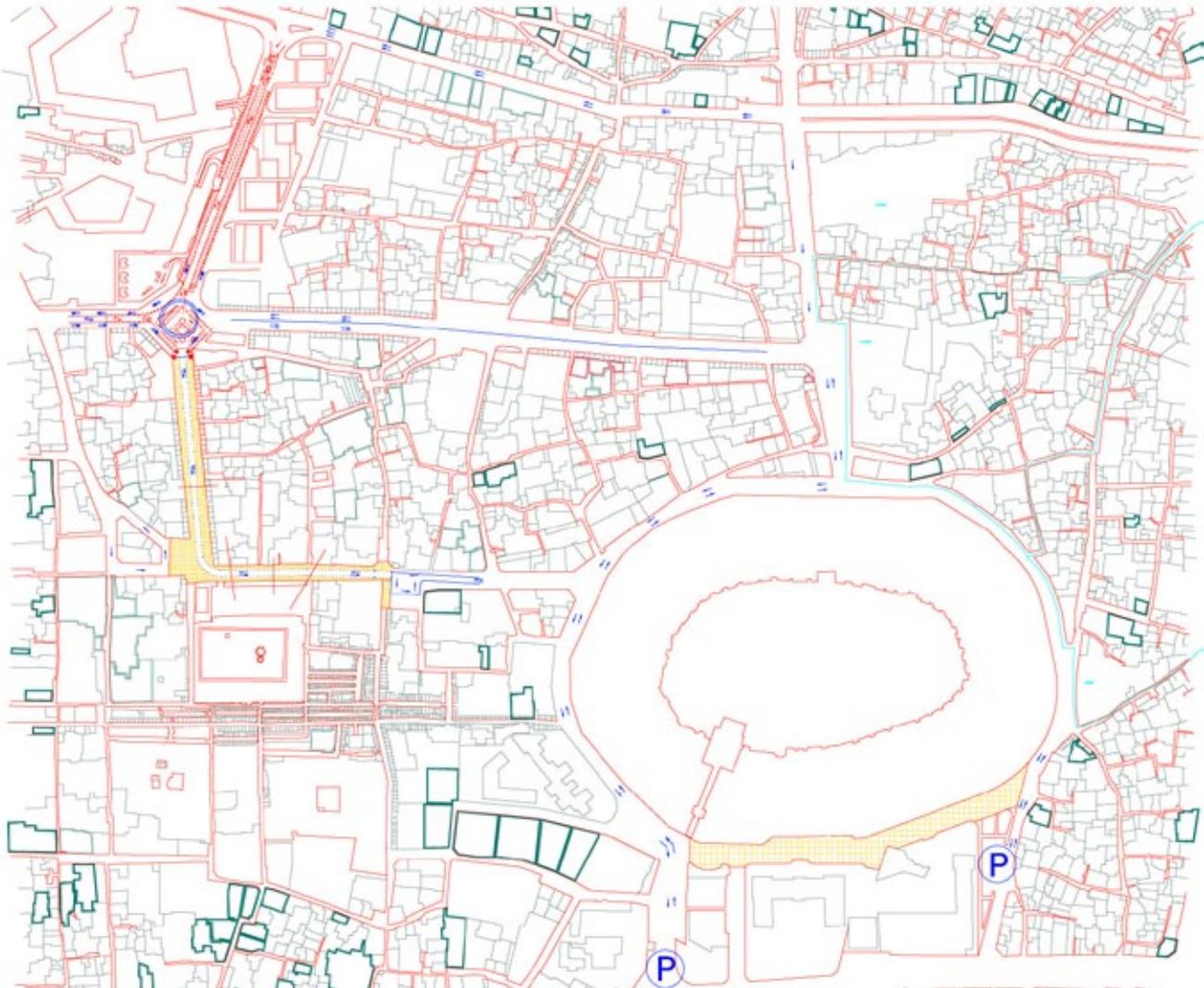
Fig. 3- 35 & 3- 36 Mosque Street solution
(source: Planco Consulting & DOC 2003)

The "winner solution", namely the Mosque Street Solution, has chose to locate underground parking facilities (1200 parking spaces only for private cars) underneath Abdel Mun'im Riad Street which is strategically located between two important pivots in the old city (the main souks and Jedaideh) and it managed to significantly cut all transit traffic (east-west and north-south via the citadel) by only changing the traffic direction in the street between Sijin Street and Khandaq Street. Also this solution foresaw the closure of Mosque Street to vehicular traffic and opening it for the exclusive use by pedestrians and buses (see figures 2-35, 2- 36)

Although both of the solutions had positive effects on the old city, the "Mosque Street Solution" was finally chosen as its realization would be easier, due to wider streets, and it would have less disadvantages in case impacts were measured in the total included network and thus would create more advantageus conditions for the old city.

Number of Parking Spaces for Residential Households
As mentioned earlier, the traffic group have provided an estimation of the number of parking spaces needed to serve the old city,
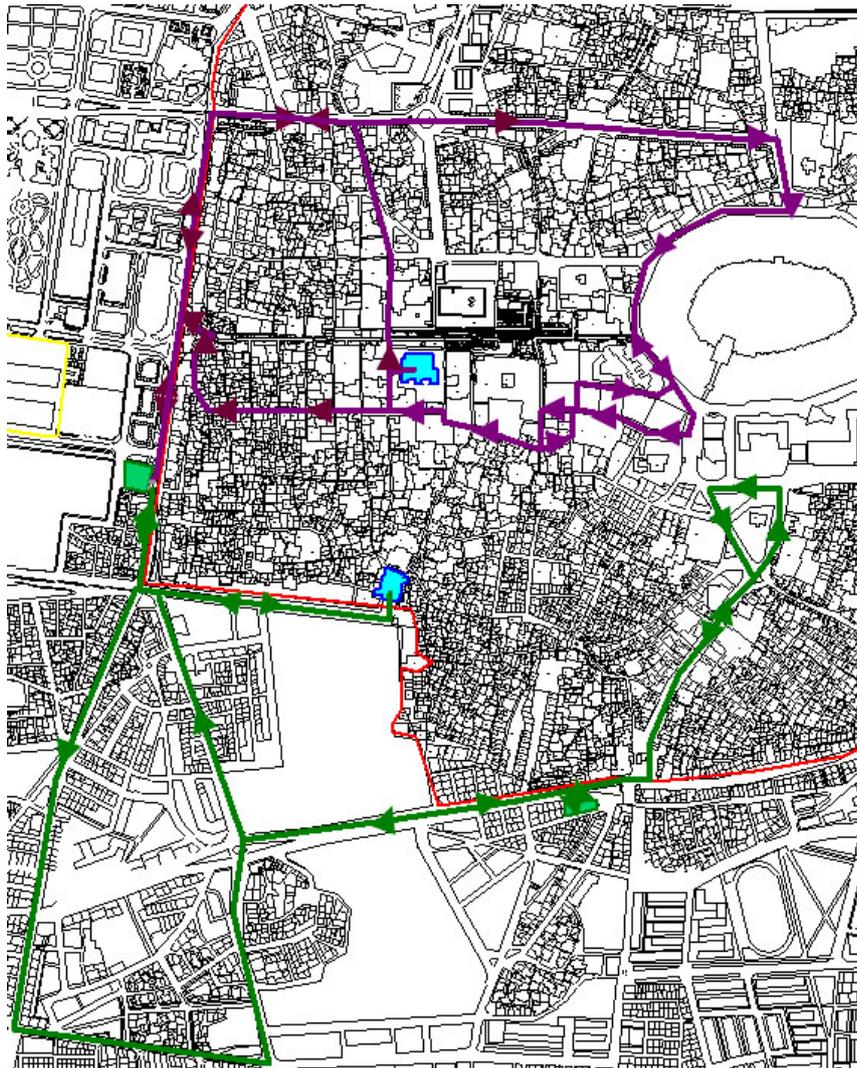
Fig. 3- 37 Proposed goods distribution and
collection in the old city
(source: Planco Consulting & DOC 2003)

the estimation has been made according to the "predict and pro-
vide" model based on a prediction that in 2010 one in every 5
households (with approx. 8 inhabitants) will own a car and thus
need a parking space, whereas in 2020 the number will increase,
because the prediction is that every third household will own a
car.

At the time of my field Study in December 2009, the direction of
traffic between Sijin and Khandaq was altered, Mosque Street
was accessible to pedestrians and taxis and there was no trace
of construction work of the underground parking facility under-
neath Abdel Mun'im Riad.

Delivery:

The collection and distribution of goods in the old city has been
mainly performed by Suzuki mini vans. The consultants sug-
gested that due to their small size, they are appropriate for the
historic centre, but vehicles of the same size but more environ-
ment-friendly should be considered

The proposed concept concerning the collection and distribu-
tion of goods by the consultant involves the use of already ex-
isting structures and cargo facilities. The souk will continue to

be served by the city terminal in Khan al Jumrok, another cargo facility located at the southern gate will be turned into a second city terminal serving the southern parts (Bab Qinnisreen). Distribution and collection lines will start and end at the cargo facilities

The Proposed Waste Collection System

The aim of the new plan, has been to differentiate between residential waste and industrial/commercial waste. The door to door collection was determined to be the only feasible solution inside the traditional quarters of the old city, whereas on wider streets with modern multi-story houses, containers will be placed in the street, where the inhabitants themselves will dispose of their solid waste. Special technical equipment to empty these containers has been made available.

Smaller commercial establishments will also dispose of their waste in public containers that are located nearby, whereas bigger establishments and restaurants will have to have their own containers that they manage individually.

The old city has been divided into collection areas. The size of the areas has been determined by the length of facades where the garbage has to be collected. For each collection area particular workers will be continuously responsible. The collection will be carried out at fixed times each day between 8 a.m. and 12a.m as most of the household garbage is produced at that time. This has the advantage that the inhabitants get used to the person as well as to the timing of the garbage collection. In the older parts of the old city the collection will be performed by workers with wheeled push carts or tricycles. The garbage collected from the households in residential zones with conventional houses will be brought to determined transfer points where containers are located and a cable car passes either to empty them or to directly take over the garbage. A penalty has been foreseen protected by law to encourage obedience to the collection times and use of the plastic bags.

When drawing up the new collection plan, experts took mainly into consideration the financial limitations of the inhabitants, the warm climate, the narrowness of streets as well as the social and religious education of the population. Information and awareness campaigns were also foreseen in the plan.

Street Cleaning

The new plan has determined that cleaning the main axes, major tourist areas and public spaces will be the responsibility of the municipality where the cleaning will be performed by use of conventional street brooms with pushed carts, by mechanical street sweepers or vaccum cleaners. Vaccum cleaners are to be used in areas where sweeper trucks cannot access, like the different souks, khans, religious facilites and certain axes in the residential quarters, but the plan determined that for cleaning the rest of residential streets, residents will become responsible according to a law issued in 2004. Their performance will be controlled by police or special administrative units from the municipality.

Public Transportation:

The plan proposed by the consultant in 1998 suggested five bus lines covering all the historic city' neighborhoods, (see figure 2-38) According to this plan, bus stations would be distributed in a manner so that they are attainable within a 5-minute walk regardless of the users' location, only very few areas would lie beyond the 300m diameter, but this would also be acceptable since people usually are ready to walk up to 400m, even more.

Most of the lines would run at the outer bordering edges of the historic center or along the wider streets that were cut into its historic fabric (Sijin Street, al-Umawi Street, around the citadel etc.), two lines would be allowed to cut through the old city from the south to the north, one line also through neighborhood streets, but these buses will enjoy this right exclusively , private cars will be banned from doing the same.

In 2002, when an overall traffic concept was being drawn up for the entire old city, only two bus lines were operating inside the old city namely Faid and Jamilie, starting at the university (located west of the old city) and ending near the citadel. As previously mentioned, it had been decided that more detailed analyses were necessary in order to determine the potential of the bus mode and to better determine the routes; passengers of the two lines were interviewed concerning the frequency they use public transport and the purpose of their trips, and bus occupancy at various times of the day was examined.

The results of these surveys, that were published in a separate report in 2002, show that approximately 70,000 passengers used these buses, and that more than half of these were using the bus to get to their workplaces in the morning. Furthermore, the sur-

Fig. 3- 38 Bus stops evenly distributed to be reached from almost any point in the *medina* within a five-minute walk
(source: Planco Consulting 1998)
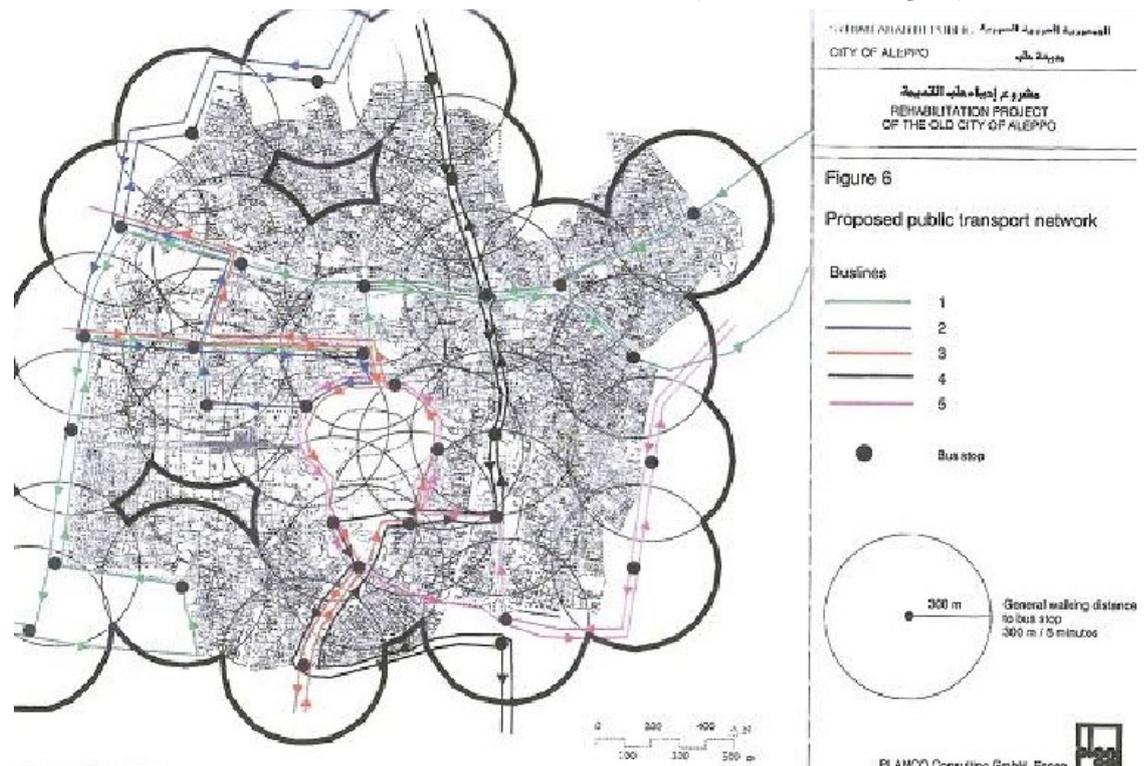
veys further testified to the importance of the old city as a working and shopping area. In addition to indicating the potential of an efficient public transportation system to increase the attraction of the old city, the surveys also revealed the bad image of the existing buses as only 16% of the passengers at that time considered them clean and comfortable, whereas the price rates didn't seem to be an issue.

Accordingly, more routes were proposed to support the two lines already in place, but customized to the "winner solution", so that they play a complementary role to the overall traffic concept. Although they don't match exactly the routes proposed in 1998, they follow the same logic of routing buses on the main wider streets that were cut into its fabric and other lines tangential to the old city: one tangential route to its west (along Antakia street), another serving the old city from the south and one tangential route running to its east and north [Planco Consulting & DOC 2003].

At the time of this study's field research, in December 2009, micro-buses were already removed from the old city but only the same two bus lines (Faid and Jamilie) were in operation, the rest of the proposed lines in 2002 were not yet implemented, only taxis were also allowed to serve the *medina*.

This retardation could be linked, as one planner at the directorate of the old city explained, to the fact that the directorate is conducting another study on the feasibility of using electric small cars in the *medina*.

Fig. 3- 39 Bus lines in support of the Mosque
Street Solution
(source: Planco Consulting & DOC 2003)

Recently another route for the bus travelling across the old center has been determined, namely the Citadel Route passing through al-Hawwar Street, Sijin Street, Bab Jnein, al-Qasr al-Adli, Jabb il-Qibbe and Bab al-Hadid.

3.2 QUARTER & STREET LEVEL ANALYSIS

3.2.a A Residential Quarter: Hayy al-Jalloum
The choice of this quarter for analysis is justified by its strategic location in the immediate vicinity of the main souk; this location has exposed it to additional challenges, which makes it reflect all of the important problems of a complex inner city situation. Also this quarter has been chosen in 1998 as the Action Area1 (AA-1) where first rehabilitation experiments were carried out, and for which the first traffic plan was elaborated in the old city. It was to serve as a prototype for application of urban improvements in order to transfer them to other parts of the old city.
Ten years have passed since then, and although the situation by and large has improved, there are still problems, especially in the streets adjacent to the main souk.

3.2.1 Physical and Spatial Analysis
• Location
Al-Jalloum is a predominantly residential neighborhood located in the south-western part of old Aleppo. It has been inhabited as far back as the 12th century.
Jalloum quarter occupies 0.231 km² surface area and incorporates the following sub-quarters:
Jalloum Kubra, Jalloum Sughra, & Souk Bab Qinnisrin
North of Jalloum the old city's main covered souks (Aswaq al-Madina) are located, to the south Qal'at al-Shareef and Tallet al-Soda (an area foreseen as a future park) are bordering it. To the east it is bordered by Maqamat road, from the west a wide and busy street, Bab Antakia Street, separates Jalloum, along the historic city's western walls, from the rest of the extended (new) city.

• Population / Social Situation
In the 16th and 17th centuries the quarter was a relatively wealthy neighborhood where merchants and notable families lived. This continued to be the case even in the first half of the 20th century,

Fig. 3- 40 Location of al-Jalloum quarter within the *medina* (in yellow)
(source: map from Bitar, Herrle and Nebel 2005, amended by author)

Year	Number of inhabitants
1981	7616
1998	5016 (a 34% drop in 17 years)
2000	5770 estimated

when this area was populated with the better-off stratum compared to the quarters east of the citadel, where mainly farmers and Bedouins lived. Here traders, merchants and doctors sided with lawyers and clerics, most of them Muslim except for some Christian houses around the Church of the Holy Land (today's al-Shibani school).

Today, Jalloum's 5770 residents are mostly wage earners, of whom 70% are builders and tillers who work in the old city and nearby areas and their daily wage doesn't exceed 200-300 Syrian pounds.

75% of the houses are owner occupied, 40-50% of residents are descendants of the original occupants that have a 150 year old tradition of living in the area, and most marriages are to neighbors and relatives. Over fifteen years (between 1981 and 1998) the neighborhood has lost approx. one third of its population [Jansen et al. 1998]. Population density has gone down to 275 p/ha (8p/household), what has mainly contributed to this fall , apart from the extension of commercial activities, is the low income level of its inhabitants who cannot afford to maintain or renovate the decaying old houses. Also the prohibition of subdividing the houses has taken its toll and the eagerness of young couples seeking independence has further encouraged them to leave and buy houses outside the old city.

Some of the residents work in the old city and nearby areas, but the owners of the many economic activities in the area are usually from the newer areas in Aleppo or from the rural areas, who commute into the city.

Fig. 3- 41 Bimaristan Arghun on Qinnisreen Street after renovation

• **Car Ownership**
Car ownership in Jalloum is very limited; there are only 10 cars in the area [Herrle et al. 2005].

• **Significance**
Although it is mainly residential, it is commercially and touristically attractive, due to the vicinity of the main historic souks, the spread of many economic activities and also because there are many important buildings and monuments in the area of high architectural or historic value. These monuments are mostly from the Mamluk period and include the Bimaristan Arghun, one of the most remarkable intact examples of one of the earliest hospitals in the world, a soap factory in addition to some historic churches and mosques like Jami' al Nouri from the14th century and two *hamams*, the biggest of which is Hamam al-Jawahiri.

Its housing stock consists entirely of traditional courtyard houses, 40% of which was subdivided between 1994 and 2004 andmost of the building stock (60%) is in a fair physical condition.

Some Jalloum residents maintain workshops in their houses, like tailoring and some residents express the wish to sell their hous-

es, especially if they are sharing it with their brothers or relatives. A wish for independence is the most frequently given reason for selling by both genders.

• Street Pattern / Urban Structure

The street pattern in Jalloum is traditional, irregular and well preserved; the Mamluk urban fabric with narrow cobblestone paved streets, semi-private sometimes vaulted dead-end alleys and the courtyard houses interspersed with public buildings is still intact.

An exception to this dominant irregular street pattern is the area south of the main bazaar, starting at the western Gate (Bab Antakia) the main axis of the present souk runs for a length of around seven hundred meters in a west-east direction continuing straight to the citadel, off this axis the traces of six more lanes running southward can be detected, north of the main axis four more south-north lanes can be traced, these streets are straight and perpendicular to each other and form rectangular insulae (blocks) measuring about 124 by 47 meters. They are the remnants of a Hellenistic grid plan.

Jalloum was the first area whose streets were categorized when it was chosen as Action Area 1; and they were categorized in terms of their suitability for usage or passage by cars:

The traffic team has differentiated between three types of streets:
1- Closed (impermeable)streets
- Residential cul-de-sacs in Jalloum further contribute to keep
   ing through traffic away from residential areas
- Streets ending with stairs
- Inaccessible streets, due to extremely sharp angles or inad-
   equacy of the street surface or due to fear of a building's wall
   collapsing
This type can be mainly found in the south western residential part of the area and is primarily used by pedestrians and bicycles, service vehicles cannot penetrate this type of streets.
2- Open non-arterial streets: these are very narrow streets that can be used by small-sized vehicles like Suzukies and tri-motorcycles for serving residents
3- Permeable arterial Streets: these are a little wider streets that are used by pick-ups and smaller cars and mainly used for goods transportation to and from the souks, Khans and workshops and for servicing residents especially in the streets parallel and close to the souks, and the eastern streets.

• Structure of the Urban Block

The urban structure of the residential neighborhoods is contiguous and cellular, the housing blocks have formed by a gradual and additive process based on the single type of the courtyard houses, whose mostly blank windowless exterior walls align the streets. Urban blocks in the *medina* have a great variety of sizes and are irregularly shaped. As explained in chapter I, streets, especially the secondary streets and cul-de-sacs, follow up on the

Street Typologies
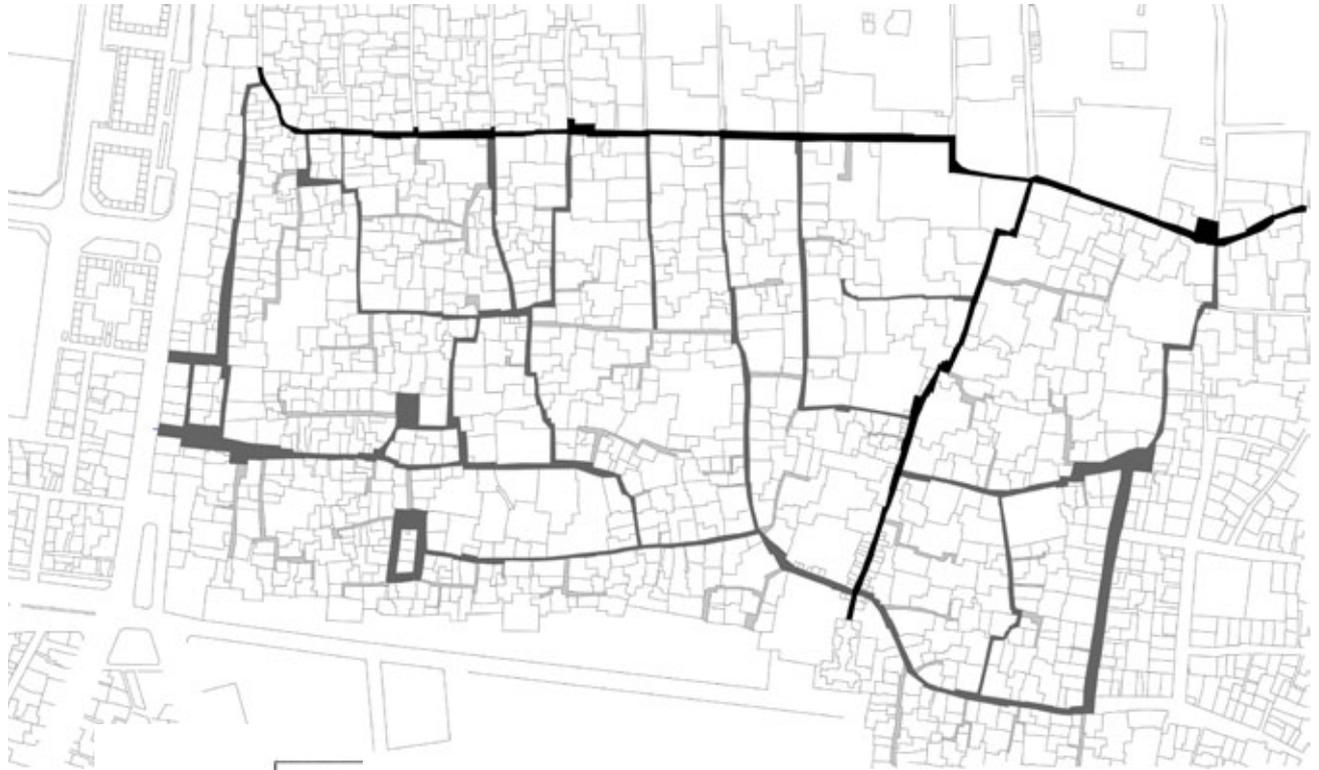
Fig. 3- 42a Street hierarchy in Jalloum: main streets in black, collectors in dark grey, minor streets and cul-de-sacs in light grey

Fig. 3- 42b Bab Qinnisreen, a main street with some shops serving the neighborhood
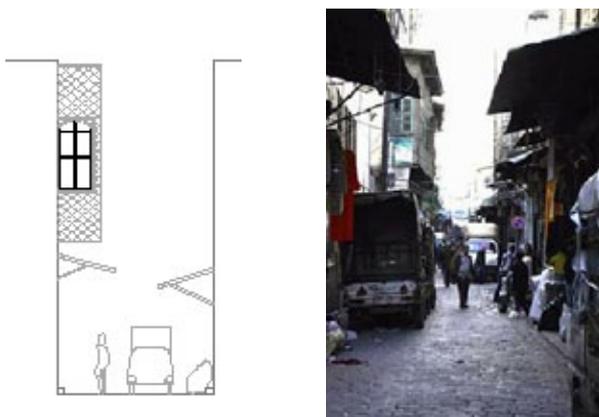
Fig. 3- 42c Jalloum Kubra, a main commercial street with high pedestrian densities

Fig. 3- 42d Hammam al-Malha, a second order residential street with some shops and workshops

Fig. 3- 43 Built-up area versus open space along Bab-Qinnisreen Street
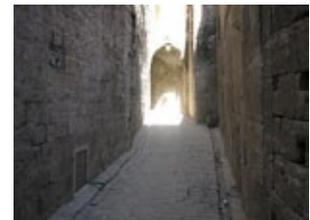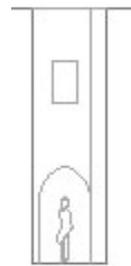
Fig. 3- 42e Darb al-Banat, a dead-end street

Fig. 3- 44 Figure ground plan of al-Jalloum

placing of buildings.

Social control is also an important tool for security, in traditional Arabic residential quarters people simply know one another, know who is going where and can easily identify any stranger entering their streets. In contrast, market streets one can find many strangers, tourists and non-residents en route.

• **Type of abutting developments**

Buildings abutting the residential streets are traditional court-yard houses, mostly 2-3 levels high, flat roofed and made of stone. Quiet and crepuscular alleyways branch off from the bus-tling commercial streets into the residential quarters, At ground level few or no openings exist towards the street, the rooms are arranged on the sides of the courtyard, which when weather per-mits, becomes the center of many domestic activities.

one can suggest that this makes the streets not well overlooked by the houses and therefore they are unsafe (lack of residents' control over their street since they are focused towards the center of the house), but in traditional Arabic cities *mashrabiyyas* in the upper floors have had the task to give residents the freedom to discretely watch the street from above, while giving one the lux-ury of not being seen from the street. In contrast to the commer-cial streets where many different strangers have presence, it is easy to know who is going where in the residential streets, here people know each other, and a stranger can be easily identified.

Fig. 3- 45 A Suzuki is parked illegally along the renovated Qinnisreen street

3.2.2 Functional Analysis
3.2.2.1 Land Use

Jalloum is typified as belonging to strategic zone Type B, which means it belongs to zones that are predominantly residential (60%) but undergoing moderate changes. These changes are the result of the quick expansion of the commercial center (main souk) north of Jalloum which has exercised increased pressure on the adjacent neighborhood's land uses; leading to the trans-formation of many residential buildings of this quarter mainly into commercial uses i.e. storage and workshops, hence commer-cial activities make up 20% of land stock but they mostly spread along larger axes, from Bab-Qinnisrin in the south to the main souks in the North, the northern extremity of this street is also connected to several caravanserais. Commercial activities can also be found in the streets extending parallel to the main souk, south of it like Jalloum Kubra, Souk Antakia along the western wall, in addition to some economic and communal activities scat-tered along some north-south streets running perpendicularly to Jalloum Kubra southwards.

Many enterprises are focused on textile manufacturing or selling, most economic activities (industrial production and small-scale commerce) in the area are performed by people from outside Jal-loum or coming from outside the old city itself. 13% of property belongs to Awqaf, whereas 1% are antiquity owned. Touristic

Fig. 3- 46 The interior of two traditional houses in al-Jalloum; one is unrenovated (a) and (b) and the other has been transformed into a boutique hotel (c), (d) and (e)

uses make up some 3%, workshops take 10% of the zone's stock, whereas services take up 5%. Only 2% of the plots are vacant. Some changes have also resulted from increasing tourists' interests and their demands in recent years, the rehabilitation measures implemented have also had a marked effect on changes.

3.2.2.2 Traffic & Environmental Management
• The situation before intervention

Traffic

Chaos ruled in the streets all through the area, most of the daytime (after 10 a.m until late evening) every day of the week, except for Fridays and on holidays, this was mainly caused by the fact that vehicular traffic including cars, tricycles and small trucks, was allowed to drive through the neighborhood since the historic
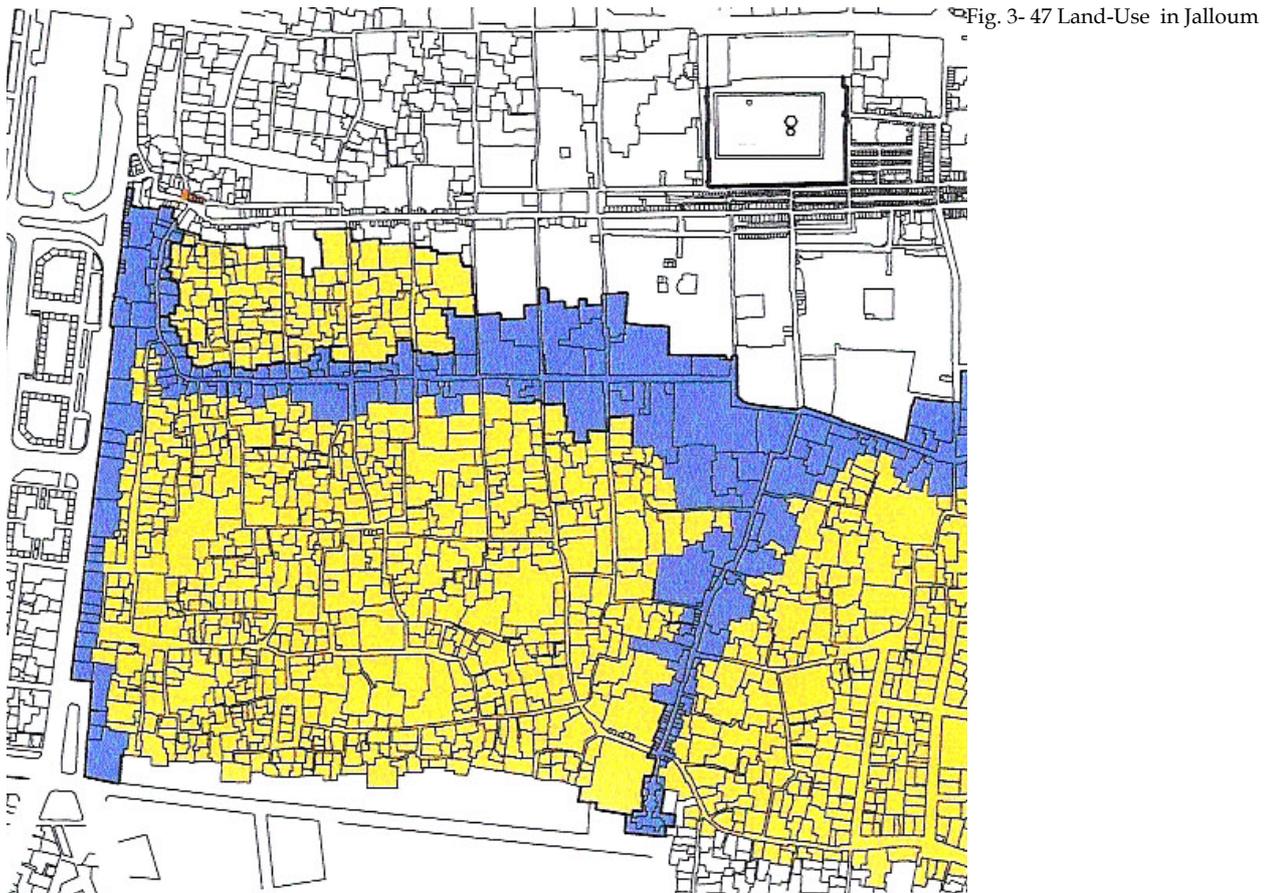
Fig. 3- 47 Land-Use in Jalloum

gate of Bab Qinnisreen was open to traffic. Also some narrow commercial streets in the neighborhood were being used two-ways, the commercial activities of the bordering souks have taken their toll on the area since they need continuous support from delivery cars (mostly performed by 'Suzukies', 1.2m wide) these transport vehicles use the same narrow streets with pedestrians (residents and tourists) often leading to paralysis, traffic jams and fights between street users.

Delivery traffic was very haphazard occurring at every hour of the day and interfering with residents' activities. Added to this is the expansion of the souks' commercial activities towards the residential neighborhoods, which threatens their peace and privacy. The physical state of the buildings was also poor and all this led residents to ask authorities for help to reduce traffic in their area.

• **Urban Intervention in Jalloum**

Jalloum was chosen as the action area one AA1, in which thorough first urban rehabilitation and traffic improvement plans have been introduced, it was chosen as a lab in which urban pioneering experiments were tested, in order to produce "exemplary" solutions and methods so that conclusions can be drawn and concepts elaborated on for other parts of the city.

The traffic group in the old city carried out in 1997/1998 an in-depth study of the traffic situation in this neighborhood and a traffic plan was worked out based on the results from these surveys. This traffic plan was adopted by the traffic committee in its

decision from 23.03.1999.

The elaborated traffic plan in Bab Qinnisreen proposed:

- to divide streets into residential, commercial and mixed streets,
- to adopt a one-way system,
- to implement a traffic and service free period during the day between (11.00-15.00 h),
- to close Bab Qinnisreen and open Bab Antakia for traffic,
- to strictly prohibit individual cars from entering these areas with the exception of emergencies (medical services, police, fire protection),
- Ensure access to and within all pedestrian areas for emergency cases, handicapped people, delivery to houses, and waste collection by introduction of one way systems,
- Ensure the fluidity of the traffic flow on existing major streets providing accessto the old city by prohibiting parking along these streets.
- Establish adequate parking facilities near the main entrances to the pedestrian areas for the residents and shop owners (long term parking spaces) as well as for visitors and shoppers (short term parking)

Fig. 3- 48 Brochure showing Bab Qinnisreen freed from vehicular traffic between 11 a.m. and 3 p.m. as part of an awareness campaign aiming at explaining the necessity for traffic managmenet in the area
(source: GTZ)

Traffic Concept of Bab Quinnisrin

Pedestrian-Only streets

Residential access streets

Supply streets

Accessibility for cars only during limited hours

Larger Parking Lots Outside the Quarter

Parking Spaces Within the Quarter

Scale : 1/1000

0   100   250
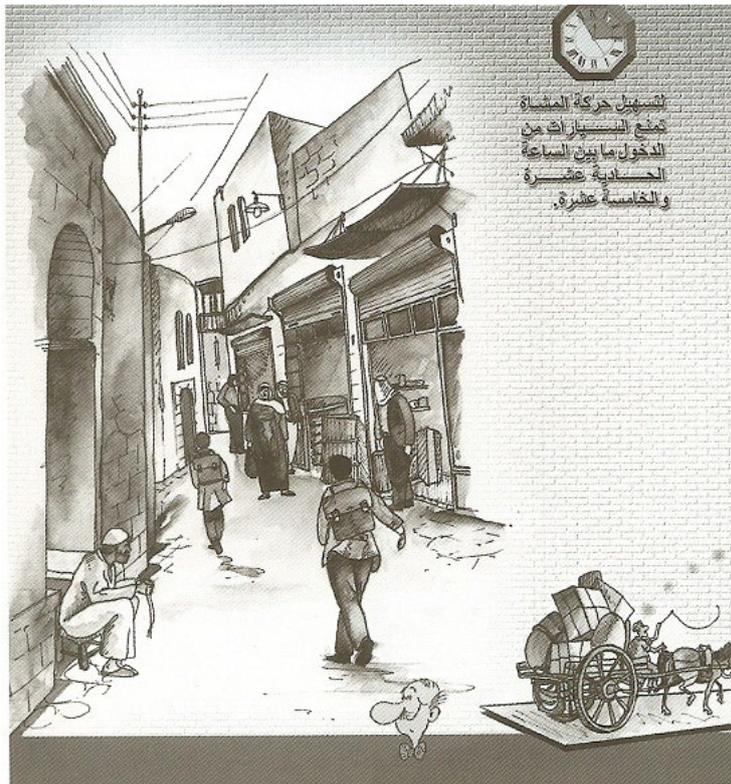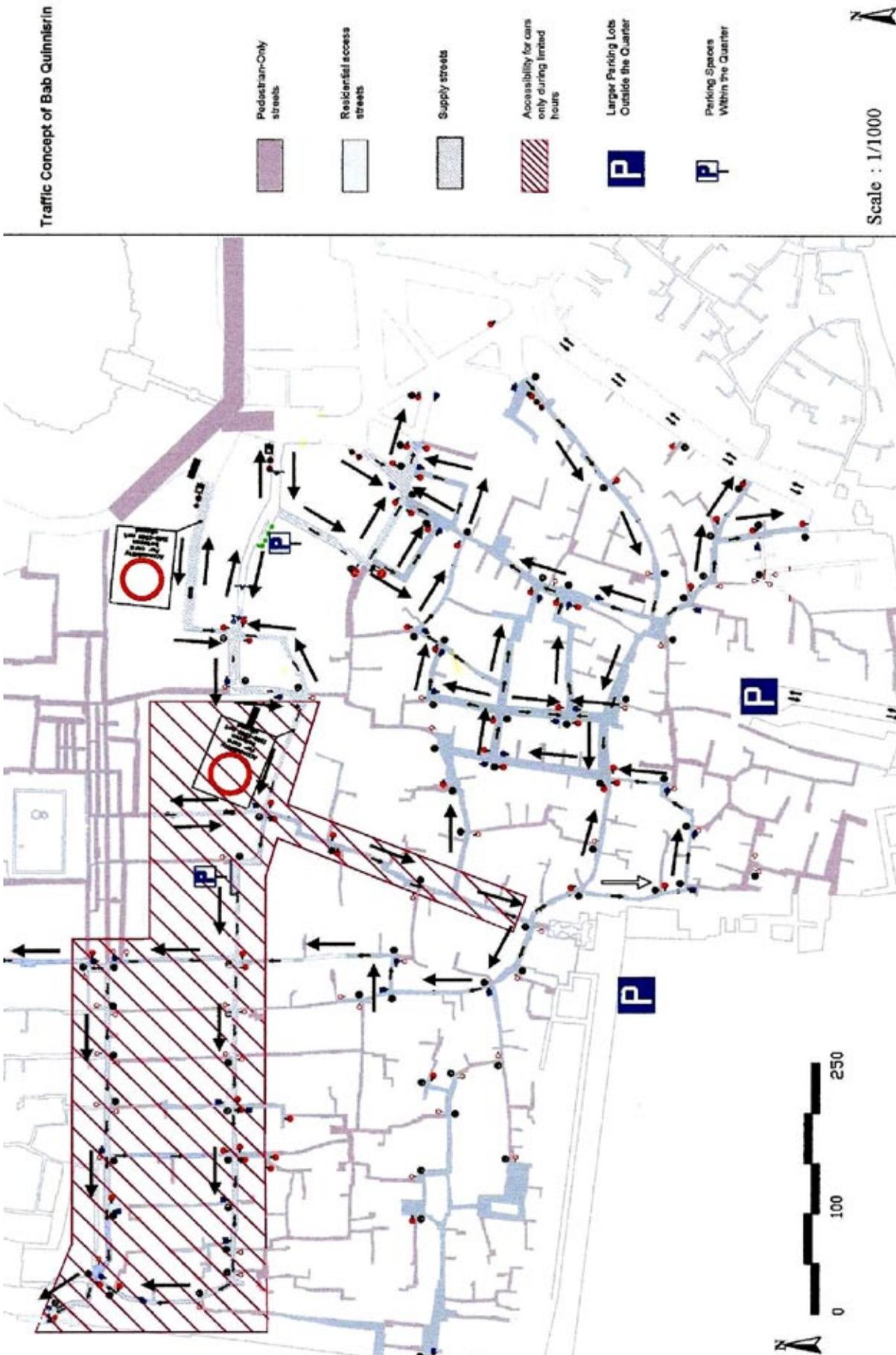
Fig. 3- 49 Traffic management in AA1 including Jalloum
(source: redrawn from original by Planco Consulting

Fig. 3- 50 & 3- 51 Bab Qinnisreen before and
after rehabilitation
(source of 2- 45: RehabiMed)

Intervention, Vehicular Traffic

Accordingly, the southern historic gate Bab Qinnisreen that was previously used as an entrance and exit for small trucks, tricycles and cars driving in and out of the neighbourhood was totally closed to traffic by means of physical measures (steps built into the street), this has interrupted the traffic, especially through-traffic that used to use Bab Qinnisreen commercial street to get from the north to the south of the old city. Instead, Bab Antakia (in the west) was opened for passing traffic.

Appropriate traffic signs have been developed and signs indicating a speed limit to 30klm/h can be seen on the plan. Technical infrastructure was renewed and the streets were paved, in addition, the most permeable streets were turned into one-way streets. Streets have been categorized into residential, commercial or mixed, in fact, the actual plan differentiates between pedestrian-only streets, residential access streets (where cars, mainly residents' cars, are allowed to enter) and service streets that are passable for delivery vehicles only. In addition, a zone has been chosen where cars and delivery vehicles are permeable at only certain times of the day.

The plan was worked out in close cooperation with the traffic police and residents of the area.

A main axis (Jalloum Kubra) was chosen for delivery through the area, this axis separates the residential neighbourhoods from the souks (and acts as a buffer). This street, that previously operated as a two-way street, has been transformed into one-way, now any vehicle in or around the old city, targeting the southern souks area has to drive from the south of the citadel in the east, pass through Jalloum Kubra and exit, from Bab Antakia in the West, cars and delivery vehicles have regulated entry times and are banned between 11.00 a.m. until 16:00 p.m., during this time the area is designated traffic-free.

Intervention, Parking

It was determined by the traffic group that no parking spaces are needed for delivery vehicles (Suzukies and pickups).

In view of the existing residential, commercial, touristic and religious activities, the traffic group decided to provide residents and visitors with parking facilities in addition to loading & unloading zones. This resulted in the implementation of a number of parking facilities near Bab Qinnisreen, and inside the neighborhood itself:

One parking facility was implemented in front of Bab Qinnisreen and was designed according to the width of the street with inclined car parking spaces separated from each other by white stones. It can house 120 cars and is much accepted by the population.

Another surface parking for 150 cars was constructed opposite Bab Qinnisreen inside Tallet Al Soudah. The implementation of this car park facility was co-ordinated with the existing facilities in matters of present activities in Bab Qinnisreen, and parking

along a street in Tal'et al Shoki Saraia Ismail Basha were also designed.

Inside the district some smaller lots and parking spaces have been designed along or off comparably wider sections of some streets (to avoid random parking) situated in front of Saffahia Mosque (ten cars), beside the cotton market (ten cars), behind Khan Al Shouneh (twelve cars) and in front of Shibani church.

Fig. 3- 52 (above left) car parking in front of Bab Qinnisreen (the southern Gate to Aleppo *medina*
Fig. 3- 53 & 3- 54(above): plan of car parks in front of Bab Qinnisreen and at Tall'et al Soudah
(source of 3- 53 & 3- 54: Planco Consulting & DOC 2003)

Intervention, Delivery

In Jalloum delivery and supply times have been restricted to the hours before 11.00 or after 15.00 hours because of the new traffic regulations and Jalloum Kubra street was turned into a one-way street (in the direction of Bab Antakia). Only zones for loading and unloading goods were designated.

• Current Situation
Vehicular Traffic

 Cutting off through-traffic from the area that used to go through residential as well as market streets (when Bab Qinnisreen Gate was still open) has contributed to a great degree in traffic-calming the residential areas of Jalloum and Bab Qinnisreen, transforming them to pedestrian-friendly residential areas.

Fig. 3- 55 (above): marked parking spaces in front of Shibani church along Jalloum Kubra Street
(source: Planco Consulting & DOC 2003)

In the northern areas, on the other hand, especially in the Jalloum Kubra commercial street, the quality of the pedestrian experience is affected by the persisting chaos in this street, cars, especially Suzukies, do not abide to traffic regulations; neither to the one-way system nor to the time regulation, which means they drive like before in two-directions in this narrow street despite traffic signs and no policemen enforce the law (although originally they were appointed to control the situation); the conclusion being that without the traffic police's continuous support these regulations have proven dysfunctional, and this, despite the fact that the new traffic plan was discussed with the people involved in that area, with merchants and Suzuki drivers alike.

Fig. 3- 56 Current traffic situation in front of Shibani church in Jalloum Kubra, Suzukies driving illegally in opposite to the direction of traffic

Also, no signs indicating the speed limit of 30km/h could be observed in the area, the limitation is only indicated on the plans.

Fig. 3- 57 Street vendor selling fast-food along Jalloum Kubra Street

Fig. 3- 58 Traffic chaos in Jalloum Kubra Street in the late afternoon

Fig. 3- 59 Delivery cars parked along Bab Qinnisreen Street waiting for their next mission

No emphasis on reducing traffic speeds, nor mention of traffic calming were in the reports.

Shops aligning main commercial streets have an extraordinary density of goods, they are not deep, and have no aisles. Goods' display extends to the street space, the *fina'*, often times the customer stands in the street while buying, while the shopkeeper stands inside the shop and uses a stick to reach the chosen item. The goods displayed on both sides of the streets occupy a width of approx. 60-100cm. Commercial streets with a high density of pedestrians are additionally occupied by street vendors with their food-stalls (see figure 3- 58).

It seems that social inclusion and awareness campaigns were insufficient and there is hardly any information on the internet in Arabic websites, which explains the objectives of these traffic development plans.

Parking

Major existing parking facilities around the area are:

- Bab Qinnisreen Parking: it is located in front of the Gate whose spaces have been regulated by the traffic department in cooperation with the Directorate of the Old City, this car parking is suffering from random parking and should either be permanently controlled by the traffic police or changed into paid car parking
- Tal'at al Soudah Parking Lot.
- Al-Garage al- Muwahhad Underground Parking (opposite Bab Antakia)
- Cars also park haphazardly along streets inside the quarter, especially in front of the Shibani church, in this chaos children from neighbouring residential neighbourhoods try to play.

Another problem is caused by Suzukies that tend to park on the sides of the streets also in places not marked for that purpose. Most of the Suzukies are owned by people from outside the souks, these Suzukies bring goods from outside the old city to the souks at a certain time during the day and are assigned to later transport goods from the souk to the outside, but the wait-

Fig. 3- 60 Conflicts between pedestrians and motorized traffic

ing time between the two deliveries can take several hours, so some drivers prefer to stay and wait and need space to park their vehicle, which leads to Suzukies parking wherever they find a place, (in this example on the side of Jalloum Kubra street and along Qinnisreen street), awaiting their next mission so there is also congestion generated from search traffic that additionally worsens the situation. Pedestrians are repeatedly forced to the sides, wait until another vehicle passes to resume their interrupted walk.

Connection to the Surroundings

Jalloum Quarter and the old Souks make up a heterogeneous but a unified ensemble, the transition from the residential areas to the main souk is to a certain degree disturbed in Jalloum Kubra, but this is to a far lesser degree than the interruption experienced when one exits the Heritage Site from Bab Antakia. Once the western borders of the old city have been reached, one is confronted with a four-lane-wide busy street, namely Bab-Antakia (named in reference to the western gate opening towards this street) with almost extinct crossing possibilities for pedestrians. It is the extension of Bab-al Faraj area and is the main border between the old and the new city since the late 19th century.

Here a sharp contrast between the heritage site and the other side of the street exists where multi story blocks and bus stations from the 1970s dominate the picture, al Garage alSiyahi alMuwahhad (the consolidated touristic garage) consists of a terminal for regional buses and inner-city public transportation and rental cars to international destinations i.e. Amman, Beirut etc. (these terminals are foreseen for relocation to the outskirts of Aleppo). Underneath the bus terminal there is a car parking garage for about 530 cars. This parking is very important since it is one of two main car parks that serve the old city area around the souks, many of the merchants or business owners of the main souks and Jalloum area park their cars in this parking when they drive to their work in the morning and are forced to cross this highly congested street with traffic, so it makes it hard to believe that such an important connection hasn't been yet established. Although this street is part of the Greater Aleppo ring road, its street space is much undefined (there is no sense of enclosure to it; this is due to the mostly heterogeneous structure of the buildings aligning the opposite side of the heritage site in an un-orderly manner, differing in size, type and physical condition. Dominating land uses vary between commercial (formal, informal), service sector, and open spaces. (Offices usually located in upper floors, wholesale, retail and workshops on the ground floor, market areas in the open space.

Meanwhile, a remarkable number of specialized stores for sanitary goods, tile and construction materials in addition to shoe repair shops directly align the city wall.
In 1980, in a report by Stefano Bianca about this area it was

The urban environment within the streets' space has markedly improved especially in the residential areas and Bab Qinnisreen area, the improvements of the houses, utility systems, renovation of the facades all have consequently stimulated the stock market and triggered the return of some wealthy families to reside in this quarter

Fig. 3- 61 Bab-Antakia Street bordering the *medina* from the west

Fig. 3- 62 Absence of any light-controlled or marked crosswalks for pedestrians on Antakia Street, and the median is too narrow and high

Fig. 3- 63 Crossing the wide Antakia Street is a life threatening and humiliating experience especially for older people.

Fig. 3- 64 Bus terminal at al-Garage al-Muwahhad

Fig. 3- 65 Workshops and shoe-repair shops align the western *medina* walls

Fig. 3- 66 Lack of awareness of the heritage value of the *medina* translates into careless driving

Fig. 3- 67 Delivery cars parked randomly in one of the *khans* in al-Jalloum

described: "the area in front of the western wall today offers the picture of an incoherent piecemeal development. Although it was dealt with in several master plans, no consistent planning policy was applied....therefore, this area, which might well represent the last chance to achieve a unified central area linking the old with the new town, is not being utilized to its full potential". Although urban solutions by these planners and others have been suggested in the aftermath, 30 years later, the situation, nor the land uses, have changed much.

3.2.2.3 Urban Furniture:
Seating:
No seating has been noticed throughout the area due to overly narrow streets, although some resting opportunities could be useful especially along the commercial street Bab Qinisreen for instance in the *fina'* space in front of the soap factory

Public drinking fountains:
Drinking fountains are typical street elements that could be observed in this area, they provide water to the passers by. Although they are still functioning, some are in poor shape with missing knobs (probably stolen). These ornamented amenities lend an extra dimension to the street spaces by enriching them and breaking any sense of blandness.

Kishks (wooden canopies):
Nice wooden canopies that cover shops characterize some of the commercial street's façades; they are especially in good shape after renovation in Bab Qinnisreen Street.

Mashrabiyyas:
Many *mashrabiyyas* have been nicely renovated in Jalloum

Lighting:
There is standard lighting along a few main streets, the majority of side streets are poorly lit.

Surface treatment
All street surfaces in Jalloum have been paved with Basalt cobble stone

Planting
No planting exists in Jalloum streets

Traffic calming measures:
Other than paving the streets uniformly with basalt cobble stone no additional measures were observed in the area

Historic elements (precedents) and retained historical associations
In the streets many signs that explain the historic significance and background of a place for the passer-by have been added,

Orientation and way-finding

Orientation is eased in this area through the use of signposts that tell one the direction of important places or monuments.

3.2.3 Synthesis of the Street Problems in the Area:

3.2.3.1 Problems related to urban structure:

Problems related to access and traffic management in Jalloum area can be summarized as follows:

The narrow commercial streets around the souks with high pedestrian densities are used as service roads for delivery cars, these cannot accommodate traffic in two directions due to their small cross-sections, although the elaborated traffic plan has devised one-way streets, there are many cases of law breaking which entails a very high traffic density and high number of conflicts between the different users and/or the same street users, pedestrians feeling threatened by having no protected spaces. This also constitutes a high risk of deterioration of the valuable historic urban fabric, which is (or is supposed to be) heritage-protected and also the deterioration of the street surface and the foundation layers, caused by inconsiderate driving especially by delivery vans (see figure 3- 67) since these streets, covered with cobblestone, are vulnerable to motor modes.

The urban structure also makes it difficult to devise parking spaces along streets, in this case illegally-parked cars, especially delivery vehicles (i.e. along Bab Qinnisreen Street and in front of the Shibani Church), lead to more chaos, hinder the play of children and are an obstacle in the face of using the streets' space for none-traffic related reasons, like lingering and admiring the streets' architecture.

3.2.3.2 Problems related to planning and management issues:
- Augmented air-pollution especially from delivery traffic that depends on environmentally unfriendly Suzukies
- Poor exploitation of the potential inherent in some of the deteriorating old *khans*, leaving their destiny to further deterioration or to uncoordinated use as rented parking.
  The lack of control of such unplanned parking lots with undifferentiated surfaces leads to poor and chaotic parking behavior (see figure 3- 68)
- Lack of police control that can enforce obedience of rules (like traffic directions) or delivery times, making the elaborated traffic plan only partly successful
- Lack of cleanliness, waste containers and appropriate waste collection in the old city.

Fig. 3- 68 Drinking fountain outside a mosque in Bab Qinnisreen Street

Fig. 3- 69 Beautifully renovated mashrabiyya in Jalloum

3.2-b A Mixed-Use Quarter *Hayy al-Jedaideh*

Fig. 3- 70 Location of the Jedaideh quarter (in yellow) within Aleppo *medina* (source: amended map from Bitar, Herrle and Nebel 2005)
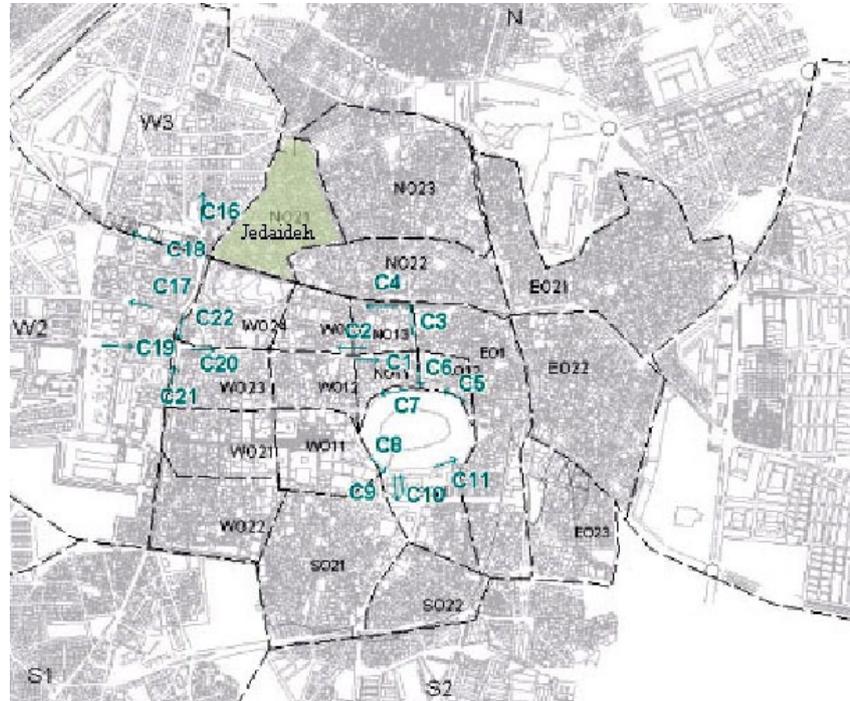
In this study, analysis of the situation in Action Area 3 will be presented, which roughly corresponds to the borders of al-Jedaideh district which has been inhabited as far back as the twelfth century.

The choice of this quarter for analysis is justified by its strategic location between the historic center intra muros and the new extensions of Aleppo city. In terms of historic value Jedaideh is a very rich and well-preserved quarter, it has also been subject to increasing investment pressures from the tourism sector, leading to higher densities and a mixture of uses, which has caused more traffic and infrastructure related problems. This quarter has also been chosen in 1998 as the Action Area3 (AA-3) for which improvements including a traffic concept have been elaborated and implemented as it represents a district category that recurs in the *medina*. This not only allows the examination of the common problems faced by this category of districts, but also the dissect ing of planning practices and their implementation.

3.2.1 Physical and Spatial Analysis
• Location
Al-Jedaideh (which means the little new) is a mixed-use medieval quarter located *extra muros* in the north-western part of the old city. Its area is around 17.5 hectares. Earlier the name was given to the area encompassing al-Hatab Square and the neighboring quarters al-Shamali, Toumaiat and al-Sissi, whereas the area with residential quarters around the churches to the west was called Salibeh. Today the name Jedaideh is given to the whole district including both Jedaideh and Salibeh.

Jedaideh is the largest and best preserved suburb that expanded

outside the old city walls, gaining in importance during the Mamluk reign. It is separated from the old city by a main traffic artery namely Khandaq Street (moat street) which is part of the city ring road. It is considered part of the old town, but in reality it is a transitional area between the old and the new cities.

Jedaideh borders in the east with an old extramural residential neighborhood. In its northern and western parts the old traditional fabric meets the new fabric. Jedaideh borders in the west with Tellal Street, which is a main commercial street, once pedestrianized but which is currently under development aiming to allow cars to pass through it at certain times a day. Al-Tellal separates Jedaideh from the Aziziyeh district in the west. In the past, Khandaq and Tellal Streets became the two first important inner streets which connected the old center with the new city extensions. Along them developed a new type of structures, namely buildings orientated towards the public space (i.e. the street) in which the traditional separation between residential and commercial functions common to the old city and to Jedaideh was given up in favor of mixed uses distributed along multiple stories of the same building. This transformation process had a big effect on Jedaideh, replacing the traditional uses at the quarter's fringes and leading to higher densities in the quarter as its unique location attracted high investment pressures.

• Population / Social Situation

The population of Jedaideh, approximately 5000 people, is largely Christian and are average income earners, often serving as civil servants. The population density average is (250p/ha), whereas density in the streets during daytime is high because of workshops. 50% of households with 5-6 people per household are owner occupied and 50% rented [Herrle et al. 2004]. More shop keepers from outside the area are moving in and the population seems to fluctuate more than in other areas as people prefer to return to the area even if they have left it. 20% of al-Hatab square's residents work in the area, 20% work outside of it, whereas in the adjacent area of Hazazeh most people work outside the area. One third of Jedaideh's working population are merchants or craftsmen, the rest are workers and civil servants and only 10% of women work. Many economic activities are owned by people from outside Jedaideh.

Fig. 3- 71 & 3- 72 Tellal Street (left) and al-Khandaq Street (below)

• **Car Ownership**

Available sources show that only 5% of households in Sahat al Hatab in Jedaideh own cars whereas the 35% of households in the adjacent eastern residential areas of Hazazeh, own cars.

• **Significance**

Building works from the 16th and 17th centuries that saw the complex of Waqf Ibshir Basha with a mosque, shops, a *khan*, *qisariyas* and a coffee house established at the center of Jedaideh opposite the already existing Waqf Bahram Basha with its *hammam* and two large *qisariyas* and shaped the future of al-Hatab square. These interventions triggered economic pressure on this northern suburb which became a distinguished commercial center whose significance transcended the local neighborhood level. In the past, the souk of Jedaideh was considered a luxury market for elite shoppers; offering luxurious, high-quality goods and services, later this central market has lost its past glamour and transformed into a more popular commercial center offering everyday products like meat and fish. Today this holds still true for the eastern commercial corridor, whereas the west side of the square and the shops surrounding al-Hatab square offer again better merchandise such as gold, silver, souvenirs and antiques. Jedaideh is famous for containing the most beautiful houses in Aleppo with high architectural value. It also houses many churches, the oldest of which dates back to the 16th century. Additionally, it is an important and attractive residential, touristic and commercial center.

• **Street Pattern / Urban Structure**

The urban structure in Jedaideh that mostly formed under the Ottomans is traditional and well preserved; the regular cul-de-sac street system gives access to relatively big plots on which big luxurious houses were built, whereas plots in the center of Jedaideh were mainly developed for significant commercial buildings. Altogether, there are around 1000 plots in Jedaideh of various sizes which are compactly built-up, only about 2.7ha of the 17.5 ha are allotted to public space (streets and squares), traditional courtyard houses (45-500m² large) constitute 30% of all houses in Jedaideh and are mainly concentrated in the center for instance 90% of all houses of Sahat al Hatab are two-story high courtyard houses, whereas apartment buildings, 5-6 stories high, and with an area of around 60m², are mainly concentrated on the southern and western outer fringes with commercial uses often occupying their ground floors.

Commercial activities tend to dominate urban street life; this is due to the availability of many workshops and raw materials in the area.

3.2.2 Functional Analysis
3.2.2.1 Land-use

Land use in Jedaideh at present is dominated by some pure residential neighborhoods in its eastern part that make up 45% of all

the land stock, and others interspersed with commercial (20%), religious and tourist-oriented functions (15%) in its central part (hotels, restaurants and shops), in addition to some services (15%). There are many workshops in the area, especially sewing and shoe related. Also there are large storage facilities in addition to several community facilities like schools. Jedaideh is typified as belonging to strategic zone Type E, with a consolidated residential use with high tourist potential and a gentrification trend.

In the past, Jedaideh was mainly used for transit since the density of jobs had been relatively low.

3.2.2.2 Traffic & Environmental Management
• The situation before intervention

<u>Traffic</u>

As explained above, Jedaideh has developed into a vibrant mixed use area with a concentration of economic activities in its center requiring deliveries on a daily, weekly or monthly basis or a combination of all three. Furthermore, the location of Jedaideh in close proximity to the main shopping center of the old city (the souks), exposes it to high traffic volumes generated by delivery cars and the ever-growing commercial and tourism-related activities. But before intervention the main problem of this quarter consisted of the transit traffic that cut through Jedaideh and conflicted with local mobility.

This high traffic demand on the north-south axis (more than 750 counted trips at peak hours between 11-14.pm) resulted from the fact that no other alternatives to this axis existed.

A study was conducted to determine trips' origins and destinations, it showed that 54% of the trips to Jedaideh originate from the old city *intramuros*, one quarter from other central urban areas and 14% from the area itself. Only a small percentage comes from other urban areas, it also revealed that the central areas are the main destinations for about 50% of the units moving in this area, while only 23% of the units targeted Jedaideh itself, followed by 27% of overall trips targeting other urban areas inside and outside the old city.

Traffic counts also revealed that the average duration of stay for cars entering Jedaideh is less than an hour in the afternoon, and that the maximum number of car units staying inside the area is less than 300. This indicated that a considerable portion of the traffic is through traffic that only stopped for short periods of time in Jedaideh (e.g. to pick something up).

This high share of through traffic is in part also generated by residents' trips heading from the pure residential neighborhoods north of Jedaideh that cut through AA3 and head towards the old city in the south in search of bigger shopping possibilities in the old city's main souk or commuters on their way to their jobs. The reason behind this was the limited shopping range and attractions in the area [Driessen 2004].

Fig. 3- 73 Figure ground plan of Jedaideh

Parked cars in the narrow streets only worsened the situation, the traffic congestion not only affected pedestrians, but it also menaced the building fabric of bordering houses with exhaust fumes and noise pollution. These narrow streets were laid originally for pedestrians, handcarts and horse or donkey-drawn carriages.

Parking
Another considerable problem was the shortage in parking spaces in the area which led to random parking, added to this aggressive driving and permanent hooting, which endangered not only pedestrians in the streets, but threatened the displays in front of the shops and increased the noise levels.

The conducted surveys showed that although only 12% of Jedaideh's residents own cars, still businesses in the area find nowhere to park or very few spaces. They further showed that 48% of residents owning a car park it in front of the house, 32% park it somewhere in the neighborhood and 20% park it outside Jedaideh.

Urban Design
A problem related to urban design was that despite its location as a central nucleus with many significant historic buildings and the increase in tourist developments (hotels and restaurants), there was a lack of a clear definition of public space in commercial streets, and commercial activities were spilling onto the pub-

Legend:
- Shops & Storage
- Workshops
- Residential
- (Public-Private) Service
- Religious
- Empty
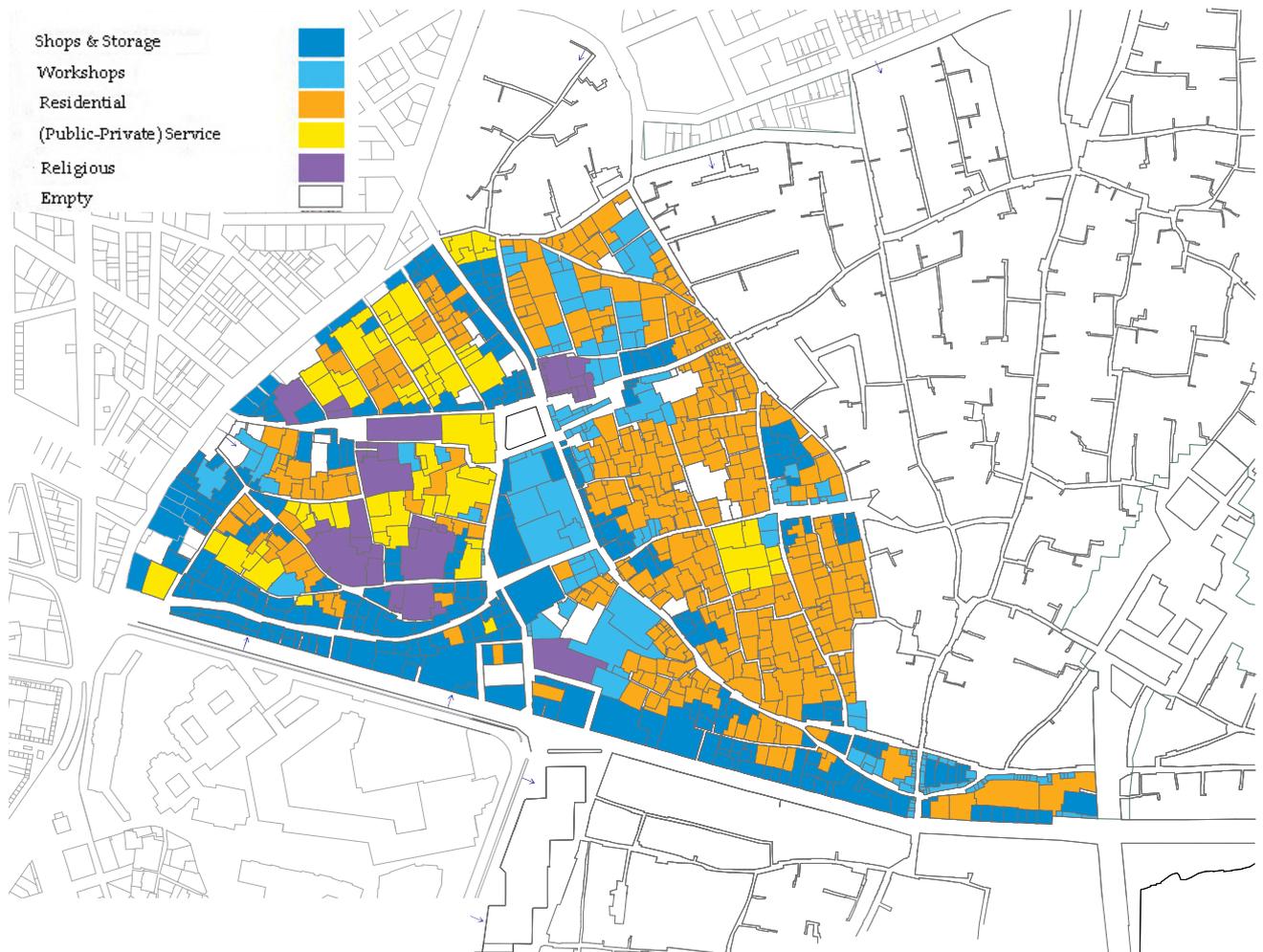
Fig. 3- 74 Land-Use in Jedaideh

lic sidewalk. Also, al-Hatab Square, which had originally been a pleasant open space with a coffee shop in the middle, became invaded by many small structures (a poultry cooperative, police station, electric transformer and generators as well as public toilets that did not meet basic levels of hygiene) and was robbed of its public function, which contributed to its demise. In addition, through-traffic had been passing through the side streets of the square.

Modal Split

Taxis make up most of all transport modes (38%) noticed in the area and are mostly used to transport people to work and back, followed by delivery vehicles: Suzukies (21%), pick-ups (20%), and micro-buses (2%). These latter do not really serve the interior of Jedaideh and do not pass through this district. Bicycles, motorcycles and tricycles make up three percent of the total and are of minor significance. Walking as a mode is not mentioned only the term "other modes" is used with 1% [Jansen et al. 1999]. Conducted surveys have also shown that most people going to work in the surveyed samples, either use the micro-bus (44%), but they have to walk outside Jedaideh, or their feet (36%), the rest use Suzukies or the bus. Most users need 10-15 minutes to reach the transportation means they use for work, 11% need more than 15 minutes, and the rest need 5-10 minutes.

• **Intervention**

Intervention Traffic

Jedaideh was also chosen as an action area, for which a traffic concept has been developed, this was accompanied by traffic studies and several surveys including a socio-economic survey and a streets' inventory. The overall stated objective of the solution proposed concerning traffic organization and traffic management in AA3 has tried to combine the objective to provide appropriate optimum accessibility to the main attractions inside Jedaideh (shopping and tourism) without destroying the urban fabric, along with the objective of improving the environment by reducing traffic.

The elaborated traffic plan included the following steps and objectives:

- The south-north transit traffic to be transferred to major roads outside the quarter.
- The internal traffic organisation to be improved by establishing a system of major and minor streets with determined traffic directions as well as pedestrian areas
- The major points of attraction in Jedaideh to remain accessible for destination oriented traffic
- Jedaideh to remain connected with its surrounding quarters,
- Parking spaces for inhabitants and hotel guests to be provided inside the quarter against fees
- The availability of these parking areas to be indicated at the entrances to Jedaideh via a car-park routing system,
- Parking spaces for visitors and shoppers to be provided outside the quarter e.g. at Bab al Faraj with pedestrian connections to the central areas of Jedaideh in form of an underground connection under Khandaq Street

It has been ascertained that in order to solve these traffic and accessibility problems, a substantial extension of traffic areas within the existing urban structure is not possible, so solutions had to be found despite these space limitations, this also held true for the establishment of parking spaces within the quarter, again despite limited open space. The quarter's main street will always be a major access to the attractions inside Jedaideh and to supply shops and other economic activities inside the area with the necessary materials.

It was further stressed that fire protection cars, ambulance and waste collection cars should be permitted to operate inside the area. Furthermore, special unloading zones have to be established in order to solve the problem of blocked streets while loading and unloading vehicles.

A main issue aside from the deviation of transit traffic was the intention to establish parking spaces outside Jedaideh in order to ease the pressure within the quarter and to make proposals to ban private traffic from certain streets and squares acceptable. Awareness campaigns were organized about traffic issues and their influence on the environment and it has been understood

that current regulations have to be adhered to by the people and controlled by the traffic police.

The basic solution separates the street network into two sections without any connection between both parts. The separation will take place near the main square, Sahet al-Hatab square and has to take into consideration that this square and the surrounding shops, restaurants and hotels have to be accessible for their clients/guests.

Three basic alternatives concerning the design of this square have been developed in close cooperation with the architects and urban planners (refer to figure 23-25). All of them separate the street network from the southern part of the network and all of them are based on a one-way system. Differences between the solutions consist of alternative arrangement of pedestrian areas, short duration parking spaces as well as loading and unloading zones. Solution III creates a large pedestrian zone between both parts of the internal network, which might lead to better acceptance of the separation. Misuse by transit traffic is much more difficult due to the design of the pedestrian area. However, access to the shopping area is disturbed by the one-way road at the southern part of the square. Nevertheless, from the point of view of traffic planning, this solution will be preferred for implementation. The deviation of the transit traffic is the basic solution to solve the problems in Jedaideh. However this strategy has taken into account that the traffic demand in south-north direction has to be transferred to other axes in the old city of Aleppo, therefore a capacity expansion of a part of Khandaq Street is considered as necessary to support the internal traffic concept of Jedaideh. The overall strategy concerning the design of the internal network and the traffic management is based on the promotion of one way streets that allow a circle flow of traffic, hence, the streets open for motorized traffic are designed as one way streets. Smaller streets are closed for motorized traffic.

The traffic flow of the supply streets west of the planning area are more or less designed as residential access streets and residential streets. The proposal reduces the internal traffic as well as transit traffic within the quarter drastically. Hence, pollution and noise are also diminished and security is raised to the benefit of the quarter's inhabitants.

Fig. 3- 75 Traffic situation in Jedaideh before the urban intervention
(Source: Gangler 2000, p. 446)

Parking

Parking spaces for inhabitants and hotel guests are provided at two locations inside the Jedaideh area, these parking spaces are not accessible for shoppers and visitors. They are used alternately by shop owners and inhabitants; shop owners use them during the day while inhabitants are supposed to use them during the night. These parking facilities are restricted and users will have to pay parking fees. Parking in the streets will be prohibited during the main periods of the day. During some periods loading and unloading will be permitted. Some space is provided

Fig. 3- 76 Traffic management in AA3 (Jedaideh)
(source: redrawn from the original plan by Planco Consulting)

near the central square for short duration parking or loading and unloading activities. Additional parking space for visitors and shoppers is proposed at Bab al Faraj North on the opposite side of Handak Street (it hasn't been implemented yet). These parking spaces are provided for short duration parking to visitors and shoppers against parking fees and will be also used by visitors to other parts of the old city.

To facilitate access to the shopping and tourist areas in Jedaideh, an underground access tunnel leading from these parking facilities and passing under Khandak street, has been suggested.
The approach to create new parking spaces was to narrow the pavements in some streets, a move seen as effective in combating travelling salesmen. Also some plots were expropriated by the city council, with the goal of turning them into parking lots and multi-story parking facilities, or for public services. This practice hasn't been received well by the original plots' owners.

Urban Design
The design of the internal streets and squares as well as the design of the pedestrian areas had to be adapted to the new traffic management concept. Street pavements, walkways, squares, loading and unloading zones and traffic signs had to be carefully planned and indicated in an implementation plan for Jedaideh. However, carefully designed urban solutions had to be developed prior to any implementation. The central Hatab square was upgraded, its facades beautified, and old master plans drawn up by the French

were reviewed in order to ascertain the original function of the space, which was indeed a public square.

• **Current Situation**
Vehicular Traffic & Parking
The intervention led to an overall improvement, and the management of traffic has been assessed as working fairly well in the report issued by the old city of Aleppo Conservation and Development Strategy in September 2005.

The field study conducted in December 2009 revealed the following:

- Demand on parking spaces around the square is larger than what is available; this could be due to multiple new restaurants that have mushroomed in the area in recent years. This leads to uncivil behavior and removal of some of the on-square bollards by force in order to create additional space and illegally park on the square.

Fig. 3- 77 A pedestrian alleyway in Jedaideh

- No parking facilities for visitors have been constructed outside Jedaideh at Bab al Faraj as had originally been planned.

- Haphazard parking continues (lack of police control) which leads to traffic halts in the already narrow streets and illegal parking on the square surface itself when a parking space is not found

- In some streets where traffic has been banned by placing no-entry traffic signs, some of these signposts have been removed and the street is illegally used two-way.

- The designers always opted for providing curbs no matter what width the street has, and what function it performs, so we see residential pedestrian streets with a 40cm-wide sidewalks, also, to hinder cars from parking on those (very narrow sidewalks) placing round bollards is opted for, which further narrows the sidewalk

- Speeds are still too high in the one-way streets like Bahram Basha Street, with most shops selling meat, despite transforming the paving of the streets from asphalt to Basalt stones, it did not help much in reducing the speeds, no design inducing calming traffic has otherwise been applied

- It has been attempted to cut the south-north traffic by banning traffic from the street bordering the main square, and elongating the drive (loop), but street vendors including farmers selling fruits, vegetable or cigarettes line up on the sides of this one-way street, drivers (obviously used to buying certain things there on their way to their destination) halt their cars in the middle of the street and block other cars behind them

(Fig. 3- 78 A street in Jedaideh)

until they get their purchase and drive away, which leads to traffic hindrance and noise pollution from honking cars.

Pedestrian and Bike Traffic

The tendency in design to vertically differentiate between the sidewalk and driveway is proving futile in the narrow streets network of Jedaideh, example of this is the street connecting al-Khandaq with al-Hatab square (refer to 3- 82), this rigid separation leaves very little space for pedestrians in the form of raised narrow sidewalks which don't allow comfortable walking, nor the comfortable passing of two persons (even with empty hands), not to mention a person in a wheelchair or a mother with a stroller. Added to this are the wooden shutters of the shops aligning the street, which stand folded once the shops are open, additionally protruding onto the sidewalk's scanty space, leaving no space for pedestrians especially if two pass each other, forcing one to descend at times, and then reascend at times (when cars drive) or leaving one motionless if cars go by, not knowing what to do. This all leads to an uneconomical use of the scarce street space and has a detrimental effect on pedestrians.

Furthermore, no provisions for bikers of any sort are provided.

Urban Public Space:

Al-Hatab square has become a splendid public space used by many different age groups all day and at night, thus bringing to the area once again its vitality and a much needed modern function as a recreational space, which is mainly used for social gatherings, as a playground for the children and helping tourists orient themselves.

Safeguarding and upgrading the commercial functions of the central zone in the quarter restored to certain extent the former glorious image of the area. Al-Hatab square is a magnet for locals and tourists alike.

Urban Furniture in Jedaideh:

Seating: seating has been provided on the Hatab Square, also in form of a ring around the tree dominating the square.

Fig. 3- 79 Differentiation between the sidewalk and roadway is prooving futile in the narrow streets of Jedaideh as can be seen in the north-south axis connecting al-Khandaq (Moat Street) with Hatab square

Fig. 3- 80 Cars illegally parked on al-Hatab square due to lack of sufficient parking spaces (note the displaced bollards)

<u>Bollards</u>: different shaped bollards have been designed and utilized, some were placed at the edges of al- Hatab square to demarcate the public space and prohibit cars from parking in its space. Bollards have also been placed at the mouth of some side pedestrian streets to prohibit cars, especially Suzukies, from entering. They are also used at the edges of sidewalks to stop cars from parking on them.

<u>Commercial Signs</u>: commercial signs have been designed to fit the historic quarter and replace previous neon-like Kishks (wooden canopies): nice wooden canopies that cover shops characterize some of the commercial street's façades; and are in good state.

<u>Lighting:</u> the streets and square are lit
<u>Surface treatment:</u> all street surfaces in Jedaideh have been paved with Basalt cobblestone

Fig. 3- 81 The shops' wooden shutters protrude on the sidewalk additionally obstructing pedestrians

<u>Planting (historically and today)</u>: many trees exist on the square
<u>Special provisions for the impaired</u>:

<u>Streets' naming:</u> all streets have been provided with names and which quarter they belong to.

<u>Traffic calming measures:</u> other than paving the streets uniformly with basalt cobblestone, no additional measures have been observed in the area.

<u>Kishks (wooden canopies)</u>: nice wooden canopies that cover shops characterize some of the commercial street's façades; they are especially in good shape after renovation in Bab Qinnisring street.

3.2.3 Evaluation of the City and Quarter-level Interventions in Aleppo

The rehabilitation project of Aleppo has certainly improved the

Fig. 3- 82 Bollards placed at the entrance to a side pedestrian street to hinder vehicles
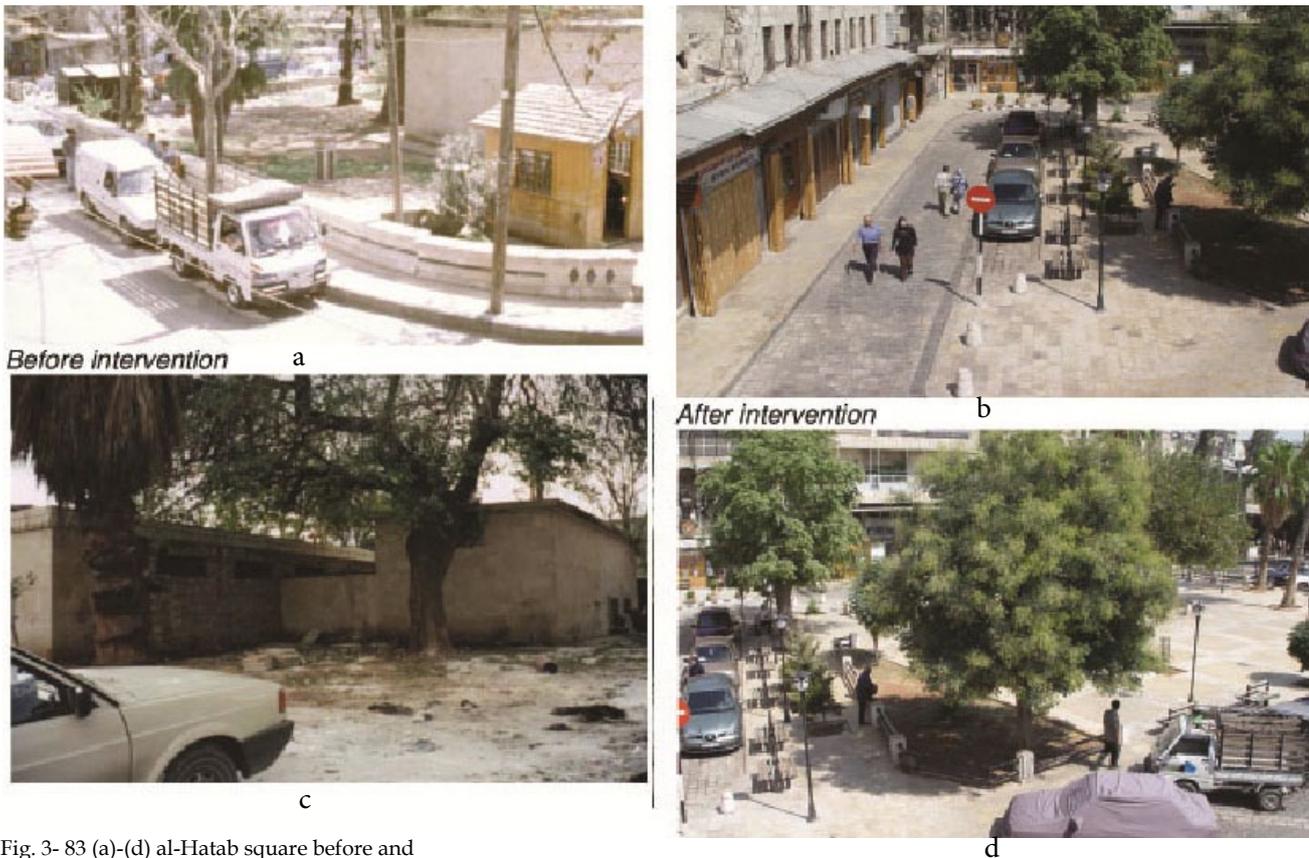
Fig. 3- 83 (a)-(d) al-Hatab square before and after intervention
(source: DOC)

Fig. 3- 84 Bollards placed to hinder cars from parking on the narrow sidewalks

living environment of people in Aleppo, cutting off through traffic away from the historic center, alone, has largely improved the situation, but the previously described traffic management practices (mainly by Planco Consulting), although sympathetic to the specificity of the historic center, with recommendations to keep the historic neighborhoods free from private automobile traffic, have nevertheless demonstrated a standard approach towards travel demand management, which pursues catering to the needs of ever-increasing automobile growth, instead of attempting to limit car usage and adjust it to existing conditions and constraints, by issuing new statutes with the requirement to supply sufficient parking spaces within each new development. This approach has no obvious correspondence to the present low car-ownership levels in the old city, nor does it take site characteristics and potentials into consideration. Similarly, the planning tendencies have also been geared towards ensuring parking spaces within neighborhoods at any price; so whenever a widening in a street or at an intersection has been available in a neighborhood, street parking spaces have been installed. This also could result in inequalities in accessibility, since this "spare space" is not available everywhere as widths of the streets vary along different streets.

With its "Action Areas" approach, it has set a good example for other cities, as it allowed to test some ideas and gain the population's acceptance when they see the benefits that come from such measures and how attractive the environment can become, but there is still a need for more, similar high-quality demonstration projects that could attract the middle-class and investors.

The project concentrated on the historic center, did not however

define the future role of the medina within the wider city context, and appropriate city level strategies, it also made no mention of how to better connect the medina with its surroundings (especially along its western walls). Some new plans are emerging, like the Aleppo development strategy, which may explain these shortcomings and why many already planned interventions have been delayed.

Socially: the living conditions of the actual low-income population have been addressed and improved and with the interest-free loans that were given to residents to repair their houses, most of the crumbling houses have been saved and a drop in the exodus from the medina was noticed, but apart from some new investments by the rich in the medina, there have been no signs of their return to the medina.
In Jedaideh, al Hatab Square has become a well-functioning public space, similarly the citadel area has also transformed into a splendid public space after pedestrianization.
The streets have been paved and rehabilitated and the image of the Jalloum and Jedaideh quarters has been markedly upgraded. Through traffic has been largely reduced, but the traffic organization inside the *medina*, especially inside the individual quarters is not that evident, neither are the allowed speeds, whereas delivery traffic management leaves much to desire, and the problem of parked delivery cars needs to be reconsidered.

Culturally/Economically: Despite the economic benefits that come from transforming some houses into restaurants or hotels, there exist no laws limiting such investments or specifying appropriate locations for them, which can have bad repercussions for residential uses (more traffic generation, noise and foreigners introduced to residential quarters that were traditionally very private). Moreover, the souks of Aleppo cater mainly to the needs of the rural and urban poor and industrial activities and production methods are outdated and generate a lot of traffic.

Technically: the interventions have shown a lack of required expertise and experience in matters of traffic-calming and street design and rehabilitation. As demonstrated in the example of Jedaideh, emphasis has always been put on physical separation between street users (as in Jedaideh) even when streets proved too narrow. The rehabilitated Sijin street (a wide street that was cut in the historic fabric), for instance, does not provide enough crossings for pedestrians, and the ones available are poorly designed, for they do not force cars to slow down. Renovation of many historic structures along the main streets, on the other hand, had excellent results, also the treatment of facades, shop signs etc, have all been designed in a way that gives the streetscape a unified appearance and fits the Aleppine context.

Chapter IV
CASE STUDY II

SITUATION ANALYSIS
OF TWO URBAN QUARTERS IN
A TYPICAL MODERN SUBURB
IN AMMAN

Case Study Amman
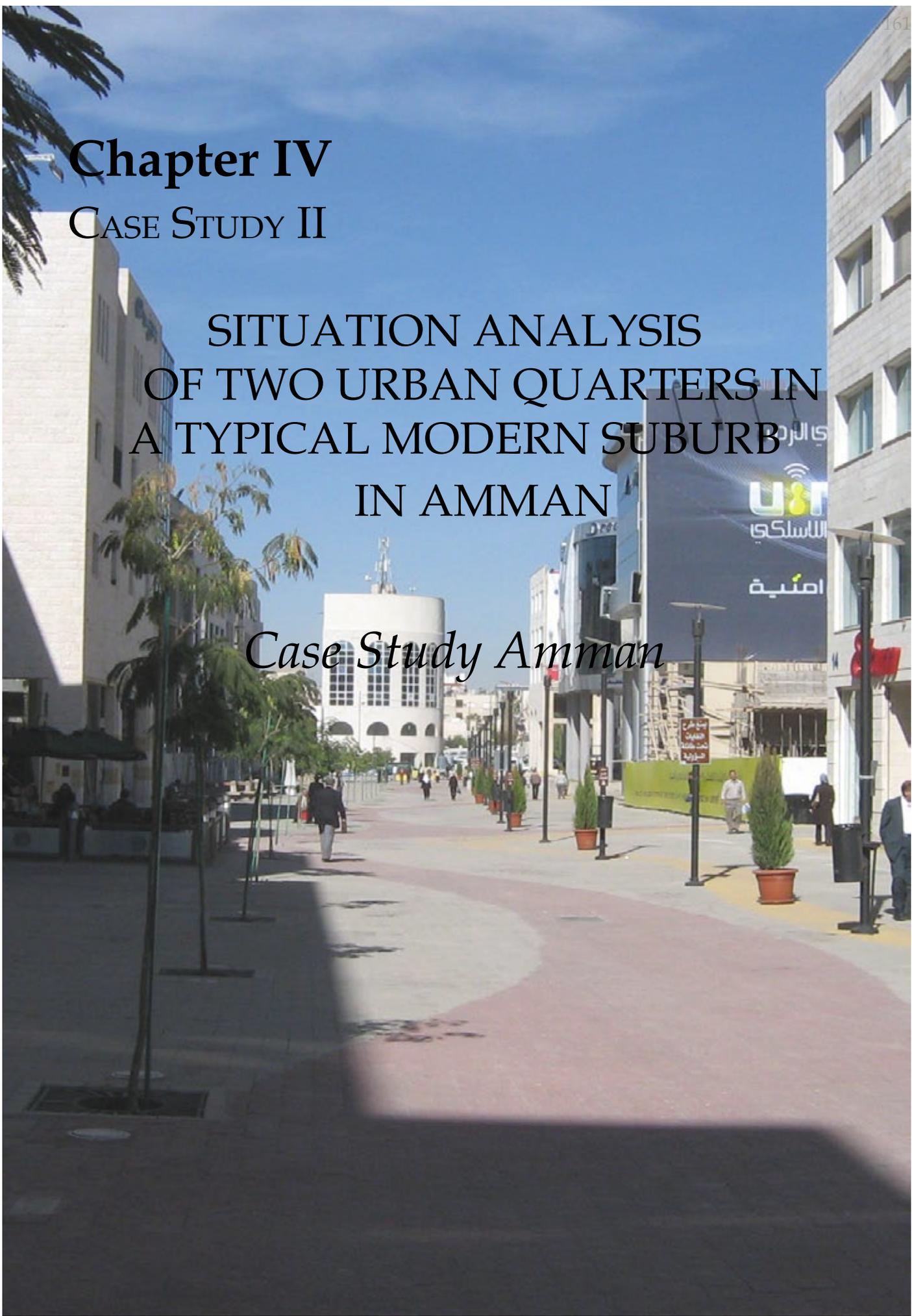
Amman City:
Main Emphasis: traffic management and street space design in a modern Arabic city

4.0 Introduction
Through the following Case Study the situation of urban streets in the context of a non-traditional, modern evolving Arab city will be highlighted, the focus will be on urban street problems faced by modern urban districts with non-traditional, non organic street networks (Type B).
The study cannot be thorough if only historic cores or old parts of Arabic cities were examined, Arabic cities have long evolved beyond their traditional cores; today *medinas* compose only a small portion of the sprawling agglomerations, housing only 2-12% of their populations, at the same time other Arabic cities do not conform to the classic Islamic city model. In whichever case, and as has been shown in Chapter I, the majority of Arabic cities acquired western-like urban fabrics, be it in the colonial, post-colonial or modern times, especially those latter were mainly planned for the automobile; having wide avenues, a patchwork of various street patterns, traffic circles and high-rise apartment and office buildings, constituting the majority of the arabic cities' contemporary urban fabric.
These modern city neighborhoods today are facing acute urban street problems as well, requiring somewhat different approaches than urban streets in historic urban centers. Case Study Amman is meant to highlight the problems of such typical modern neighborhoods.

4.1 City Level Analysis

4.1.1 Site & Origins of the City
• City origins
Amman became the capital of the Transjordan in 1921, modern Amman's existence extends little beyond the eighties, and nineties of the 19th century, when Moslem Circassians who were driven out from the Caucasus, started settling on its hills. But the city remained relatively small in both size and population until the end of WWII. After this, growth became rapid as a result of natural growth but mainly since Amman had become a refuge place for peoples who were undergoing forced migration or escaping political conflicts from neighboring countries, mainly the Palestinians, Lebanese and later the Iraqis. These multi-ethnic, heterogeneous beginnings produced the 'city of refugees', an inclusive city with mixed-identity.

Fig. 4-1 Amman's location within Jordan

• Location and Natural Conditions
Amman covering an area of approximately 528 klm² is an inland city situated upon a tilted plateau falling from west to east. The topography of Amman consists in large of a series of stark hills creating deep and at times narrow valleys at the points of their convergence, these generally run eastwards. The largest of these, Wadi Amman, defines the northern and southern parts of the city and is a significant topographical feature. The original central part of the city lies at an elevation between 725 and 800 meters above sea level, while the surrounding hills reach levels of 850m resulting in slopes exceeding 70% inclinations on some of the surrounding hills. Expansion of the city in the past twenty-five years has resulted in the occupation of some nineteen hills in total with an altitudinal extension to above 875 meters.

Most of the districts of Amman take their names from the *jabals* (hills) on which they are situated. The original site of the city occupied seven hills or 'jabals' around the valley—Wadi 'Ras el Ain which flows north-east from the plateau towards the River Zarqa basin. The original central part of the city was at an altitude of between 725 and 800 meters. Expansion of the city in the past twenty-five years has resulted in the occupation of some nineteen hills in total with an altitudinal extension to above 875 meters. Such a geological formation caused Amman to be a radiocentric city, a center (the downtown) with radial corridors of intense development emanating from it.

Amman's sprawl towards the west has been on the expense of valuable agricultural land, thus the GAM with its new Metropolitan Growth Plan is attempting to focus development in existing settlement areas.

• Climatic Conditions:
Climatically, Amman can be classified as belonging to the Mediterranean climatic zone; showing a distinct contrast between a relatively cool, rainy winter and hot, dry summer. Winter rainfall is in the region of 300mm annually, normally with the highest

amounts in January and February but in recent years, however, these patterns have been less reliable, and in 2006, for example, over 150mm of rain fell in April and May. Spring and autumn are of a relatively short duration, but are locally recognized as the most pleasant times of the year.

In terms of levels of humidity, temperature ranges, and number of sunny days the weather in Amman can support a very vibrant street life. Summer temperatures range from 28°C to 32°C, and have characteristically low humidity and frequent breezes. The prevailing wind direction is westerly to north-westerly; as long as there is a canopy to protect pedestrians from the sun or rain, one may walk comfortably in Amman during the whole year.

• **Population:**

In 2008 Amman's estimated population was at 2,406,588 million people, and it is forecasted to become 6,5 millions by 2025 [GAM 2008] and to continue to grow thereafter.

In the late 19th century, besides a handful of nomad Bedouin tribes, exercising pastoral farming, and sparse Arab farm cultivators, the dominant peoples in the area of Amman were the Circassians, Moslems escaping Russian prosecution, who were brought there as part of the Ottoman government's centralization efforts. By the turn of the century, Circassians continued to be the majority of the population and owned most of the land in the city centre and the immediate surrounding hills, but now immigrants from Greater Syria, encouraged by political stability and the arrival of the Hijaz Railroad, settled in the city to form a pioneering community of merchants [Rogan1996]. Later, other religious and ethnic minorities came to live in the city, such as the Kurds and Armenians and inner migration to Amman has also started

Since 1948 Amman's population has been greatly affected by a series of massive influxes of refugees and migrant workers fleeing conflict areas. The largest of which were the 1948 and 1967 Palestinian influxes who sought refuge in Amman, among other Arab cities, after being ejected from their homeland by the Israelis and haven't been allowed to re-enter. In addition to receiving Palestinians, Jordan has also hosted forced migrants from Lebanon during the 1975–1991 civil war. Also during and after the 1991 and 2003 gulf wars the number of Iraqis residing in Amman has risen drastically—around 450,000 to 500,000 Iraqis.

Residential densities vary between 2000 to 25000 resident population/km², highest residential densities are concentrated towards the center and the south east of Amman, whereas the workplace locations are mostly to the west of Amman resulting in relatively long cross city trips.

The majority of households have a monthly income of 200-400 JDs and the average monthly household income is 528 JDs, naturally household income is the main driver of car ownership [TMMP 2010].

Household Structure
The average size of private households is 5.3 persons / household compared to 6 persons in 1994 [Department of Statistics, Population and Housing Census 2004]. In 2009, 85.8% of households lived in apartments whereas 12.1 lived in single houses, 61.5% of housing units were owner-occupied, compared to 28.6% that were rented. The rest (9.5% live in some housing for free) [Aranki & Fraihat 2010].

Age Structure
In Jordan, 59,9% of the population are of the productive age (between fifteen and sixty-four), whereas the percentage of the dependent population is relatively low (35.3% are fourteen-year-olds or younger and only 4,8% are more than sixty-four [The CIA World Factbook 2011].

4.1.2 Amman: Urban Streets Development:
The most formative periods in Amman's morphological development can be summarized as follows:

- Ancient Times and Early Arab Period:
The Ammounites founded their capital "Rabbat Ammoun" in 1200 BC on the hill that dominates the present city center and is known as *al-Qal'a* (the citadel). The Greeks renamed the city to Philadelphia, but it is the Roman axial Hippodamian plan (1st century A.D.) with axial streets that formed the basis for the city center of modern Amman. At the bottom of the citadel (now the Acropolis), in the valley where a seasonal stream of water ran, namely Seil Amman, the longer of the axes Decumanus Maximus running SW-NE met the shorter thoroughfare Decumanus at right angle, their meeting point is exactly where the stream branched to the north.

In the 7th and 8th centuries the city was renamed Amman under the Umayyads and the monumental palace at the citadel as well as the Umayyad Mosque, among other buildings, were erected. The location of the Mosque is the place where the present Friday Mosque stands in the city center. Later Amman started to decline until it transformed into a field of ruins during the Ottomans.

Fig. 4- 2 The Roman theater
(source: courtesy of GAM)

- Resettling the Valley, 1878 -1900:
When the Circassians came, they started their settlement along the sides of the water stream which developed into a ribbon form and extended to the valley and the immediate slopes of the surrounding mountains, pathways between modest houses ran in harmony with the topography.

- Climbing Up the Mountains, 1900-1920
Introduction of the Hijaz railway attracted immigrants from the surrounding region, but Circassians owned most of the land in the city center. The new comers started settling on higher ground (up the slopes) and the new urban pattern introduced a specific pedestrian system of long and narrow stairs that connected the

Fig. 4- 3 Settling the valley along the water source
(source: courtesy of GAM)

Fig. 4- 4 (above) Climbing up the mountains, fig. 4- 5 (right) One of the oldest Streets Talal in the city center, fig. 4-6 (below) the seven hills of Amman
(source: courtesy of GAM)

Fig. 4- 6 Downtown of Amman emerged in the valley surrounded by seven hills
(source: courtesy of GAM)

valley with the surrounding residential hills, these stairs that ran down hundreds of meters were perpendicular to the mountain contours, had high walls along their sides, entrances to houses were through these walls. These stairs became the earliest communal urban spaces in Amman, today they make up one of the central city's distinctive urban features.

- Occupying Mountain Tops, 1920-1948

The financially capable settlers who owned a means of transport started occupying the mountain tops and a new form of development formed but not along pedestrian paths but along roads, which unlike the former, ran parallel to the topographic contours. Initially they were used by transportation animals, to later be used by vehicles. When car ownership increased, more roads developed in loops running parallel to contour lines. It is these relatively narrow winding streets that formed together with newly established small villa type built along them that established the new urban form of Amman

- The City of the Planners (1948-1972)

The Israeli-Arab war brought about a sudden and great population increase in Amman that accelerated growth. Until 1953 growth concentrated along the Salt Road to the northwest and Wadi-al-Sir Road to the west. With immigrants came also many professionals, graduates of renowned Arabic as well as Western universities, these started exerting their influence on the city, they created "new" visions for a new "modern" Amman and soon the first union of architects was established in 1951. Streets and land lots started to be planned; land plots became regular and restrictions on building heights, building coverage percentages and set-backs were introduced. Straight streets and gridiron pattern became the basis for growth. Between 1954 and 1963 growth continued along the same roads, but the areas between the hills; *Jabal* al-Weibdeh, al-Huseein and Jabal Amman started also to infill. Low income settlements arose along the Desert Road and at the entrances of the Amman Zarqa Corridor. Between 1962 and 1972 the built-up area of Jabal al-Hussein and Jabal Amman ex-

panded more and the bulk of the main road network was also established to reach 57 kilometers. The two largest refugee camps were established on the arid land to the south as well.

Much of the expansion now took place on agricultural land to the north, south and west, the areas east and south of the valley (East Amman) did not expand as much. Population densities seemed to remain constant and remained low, but while some pockets became overly dense, urban sprawl brought about equal increases in built-up areas, in other words, although the rapid expansion especially of high-income settlements has decreased the city-wide densities in general, other large but low-income settlements densified. This was also caused by high land prices and planning regulations requiring plot sizes that were unaffordable to the low-income population who were forced to the unplanned settlements and caused their densification.

- The Circles of Amman (1970-Present)

The big population increase, the oil boom of the 1970s, additional migrant influxes from the 1967 Israeli Arab and the Lebanese wars led at that time to uncontrollable expansion. The city expansion took two main directions from the city center: the road to Wadi-al Sir and the second the road to Salt via Sweileh. Infill along those roads continued until the city in fact linked with those towns and the popular "roundabouts" of Amman were created along these two roads, and remain today as markers and addresses which link to the history.

By the end of the 1970s, the road network reached 64 kilometers whereas the overall population density dropped to 21.7 persons per dunum, but this was due to the ongoing expansion of the high income settlements and the parallel densification of low-income settlements that reached densities up to 150 persons per dunum [Slingsby et al. 1979].

Amman's development was characterized by a radial structure, ring roads were built and provided linkages between the various radial arms.

4.1.3 The Socio-Economic Transformation:

The city of Amman has witnessed social, economic, cultural and political dramatic changes during the last few decades; it is a city of immigrants, with a rich cultural diversity, and this, it has been argued, led to a crisis in the Ammani Identity.

The polarization of Ammani population into rich and poor is stark. It has reached the point where the city is read as consisting of two parts, two Ammans, standing in stark contrast towards each other—East Amman, rather conservative and West Amman, more cosmopolitan. Even in guidebooks describing Amman one can read the following: "Eastern Amman (which includes Downtown) is home to the urbanized poor...it is conservative, more Islamic in its sympathies and has vast refugee camps on its fringe... Western Amman is a world apart, with leafy residential districts, trendy cafés and bars, impressive art galleries and young men and women walking openly arm in arm" [Ham and Greenway
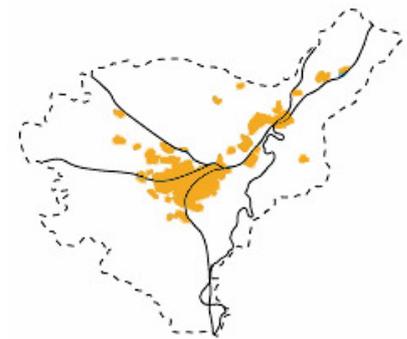
1956
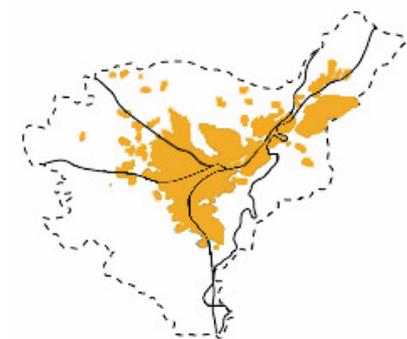
1967
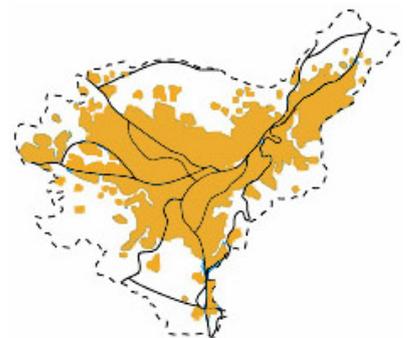
1978
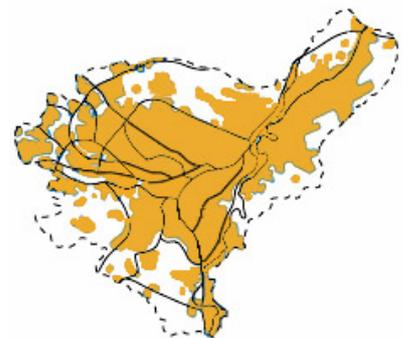
1985

Fig. 4- 7 Development of Amman
(source: after GAM)

2003].

The construction boom but especially land subdivision policies practiced by the municipalities (that remained unupdated from 1979 until 2010) had a big effect on this visible spatial and economic segregation. Zoning practices have divided residential areas into subdivisions according to plot sizes. GIS maps provided by the Municipality of Amman show how the spatial distribution of the bigger plots of Type A and Type B are concentrated in west Amman, whereas categories B and C, are mainly in the east [Potter et al. 2009]. Presently, residential quarters consisting of relatively wealthier socio-economic groups in west Amman, have much lower densities, in the region of 2,500 – 6,000 people per km² if compared to their eastern and southeastern less affluent counterparts (especially the residential areas surrounding the downtown) which are densely developed and have been also serving as the main receiving area for successive refugeesn. Here population densities vary from 14,000 to 30,000 inhabitants per km² [Potter et al. 2009]. Since residential taxes are higher for the bigger plots, urban services like street cleaning and water supply are more regular in the affluent parts.

The downtown area which had served as the main commercial center of the whole city until the beginning of the seventies and housed the most important branches of banks, money changers, the gold and silver souks, retail business and wholesale lost its central commercial position, as new commercial centers were established to serve the new emerging neighborhoods. With the beginning of the 80s most banks relocated to the new banking district in Shmeisani. By that time polarization has permeated most urban spheres, and today it can be seen in urban transportation as well as in access to social and commercial services as most important retail centers and modern shopping malls have sprung into existence in West Amman.

Recently, seven surrounding communities have been integrated into the Greater Amman Municipality. Accordingly, its geographic territory has increased by 1,000 km² in 2007, making its current total area reach 1,680 km². This expansion means that not only the number of the population inside GAM has increased,

Fig. 4- 8 & 4- 9 Shopping malls (left) built at the city's periphery are competing with on-street shops throughout Amman. Retailers in many areas (especially in the downtown) struggle to keep shops open

but also the extent of area that should be integrated into any transport planning. Also there are significant urban areas and populations immediately adjacent to Greater Amman, namely Zarqa to the north-east (852,700 people), Salt to the North West (110,573 people) and Madaba to the South-west (143,000 people). The rapidly growing population of Amman is expected to increase from the current 2.4 million to 6.4 million by the year 2025. This rapid increase in population, along with the increasing role of women in society and a high fraction of young population that will enter the work force, will significantly increase the demand for transportation.

• **Current Economic Trends Affecting Urban Development:**
At present, the economic shift introduced with the arrival of the new King Abdullah to throne, which emphasizes the spread of privatization, economic and technological development, has opened the road for neoliberal large-scale developments which, despite claims to the opposite, are subsidized by the state for the benefit of the business elite of the region, to create flagship projects of urban restructuring aiming at encouraging as much international investment as possible [Daher 2008]. As a result, a partial transfer of design and political control from local governments and citizens to large corporations and the design professionals that they hire, has occured. This has resulted in projects like the still ongoing Abdali project which is promoted as "the new downtown of Amman", it is an example of such neo-liberal endeavors, where public information about the project is minimal. Such types of developments are feared to intensify the socio-economic cleavage already in place, not only between east and west, but between this "elitist urban island" and the rest of the city, as this Abdali project, although only 1,5 km away from the old downtown, completely turned its back onto it and entailed the relocation of the long existing Abdali transport terminal with the drivers, informal vendors and occupants to the outskirts of the city. The proliferation of such public-private partnerships can additionally impede the way towards a holistic and integrated city planning, as there is little, if any, coordination with local municipalities. So the new downtown will have a heavy impact on the traffic situation in central Amman adding to its already high congestion.
This trend also led to the production of "privatized public spaces", like the numerous gated communities, shopping malls with highly selective definition of the public, leading to a fragmented city, a "patchwork of discrete spaces with increasingly sharp boundaries".

• **Employment Structure and Spatial Distribution:**
Earlier, the sites of the rock-cutting industry, which originally built the historic downtown of Amman, were the main employment locations and were situated close to home. Today, the major challenges to employment areas include the scattered pattern of individual businesses located within GAM's recently annexed

Legend

Built Employment

Expansion Employment

Roads

Railroads

Proposed Roads

Fig. 4- 10 Employment plan as part of the Metropolitan Growth Plan showing existing employment concentrations and future planned ones
(source: adapted from GAM 2008, p. 139)
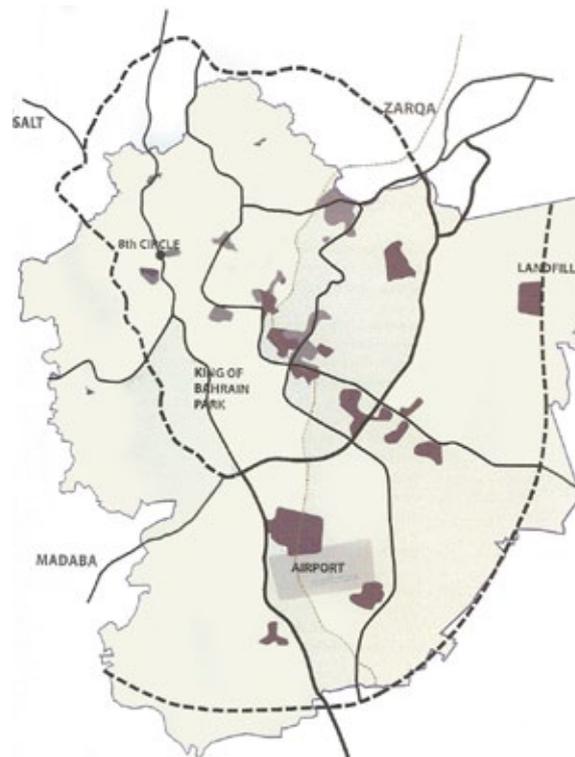
areas, which leads to outward sprawl, also the problems with land use compatibility in Amman's existing employment locations, primarily due to non-employment uses infringing on established businesses, in addition to a lack of land dedicated to the changing of industry itself towards the knowledge sector [GAM 2008].

In 2006, most Ammanis worked in wholesale and retail trade, the repair of vehicles, personal and household goods, this was followed by manufacturing activities, education and public administration respectively.

In terms of the intra-urban location of jobs within the city, a number of spatial nodes stand out. These include the combined Abda-li area, plus the old bus and taxi depot and the western entrance to the city with 8154 enterprises, al-Qwaismeh (7258 enterprises), Wadi al-Sir (including Sweifieh) (7256), the downtown area (7095) and Tla' al-Ali (7019) to the northwest. Since these workplaces are mostly concentrated to the west of Amman, once again a generalized west-east split emerges, with the western parts of the city housing most of jobs, the city's most modern shopping centers, universities, hotels, sports stadia and other amenities [Potter et al. 2007], as for the location of health and educational facilities, these have developed randomly without any correspondence to actual population distribution [Makhamreh 2011], but a large number of higher educational places are towards the north west of Amman.

The aforementioned municipalities that surround Amman, namely Salt, Madaba and Zarqa, are located within Amman's catchment area for commuters coming to Amman for work, and the first two, in addition to the Greater Balqa, are tourism destinations as well. Many people are expected to live in these mu-

nicipalities in the future, especially in Zarqa, because of lower land prices and the new regulations that restrict development in agricultural areas.

4.1.4 Amman's Characteristics that Add Up to the Transportation Challenges:

- The anticipated Amman population growth from approx. 2,200,000 in 2006 to 6,500,000 in 2025
- Its hilly topography
- Expanding development pattern based on low-density urban sprawl with single-use residential districts, alarming levels of car ownership growth (20% per annum)
- Automobile-dominated transportation system with resulting congestion, air pollution and marginalization of the pedestrian
- Serious shortage of affordable housing that will reach critical proportions especially that the old regime of rent control has been given up in 2011
- Decreasing level of focus in the urban structure with the decline of the old downtown and the planned new downtown "Abdali Complex", regional shopping malls and scattered residential projects
- Creation of a "new downtown" in Abdali: an office and commercial district, with 40,000 residents, 15,000 jobs and 50,000 visitors
- Lots of planned new development and the future expansion in the urban envelope with the newly planned mixed-use developments in areas such as East and West Amman (Amman development corridor etc), the intensification corridors and the "meropolitan growth centers" in addition to the high-density mixed-use areas such as Central Parkway, Northern and Southern Gateways (see figure 4- 11)
- East and southeast Amman consist of densely developed, less affluent areas. There is a significant and growing travel demand for service-sector workers from these areas travelling to employment opportunities in central and west Amman
- As shown, planning policy will concentrate on increased density of housing, thus creating a large demand for internal trips within the city which can lead to increased congestion, in view of the the current dispersion of retail, health and educational facilities
- Although the land use plan of the new Masterplan [GAM 2007] designates and shows areas where locating high-rise buildings is allowed, forbidden or allowed under certain conditions, this plan is inconsistent with another plan, the so-called "tower vision"plan or the interim growth strategy published by GAM which calls for locating high-rise buildings within four new designated zones where skyscrapers can be built. One such zone is devised along a route, two zones are within urban blocks where the towers will surround residential areas, whereas the fourth corresponds to the new Abdali downtown. This has already raised criticism from local professionals that see the area dedicated for tower construction as too large for a city like Amman
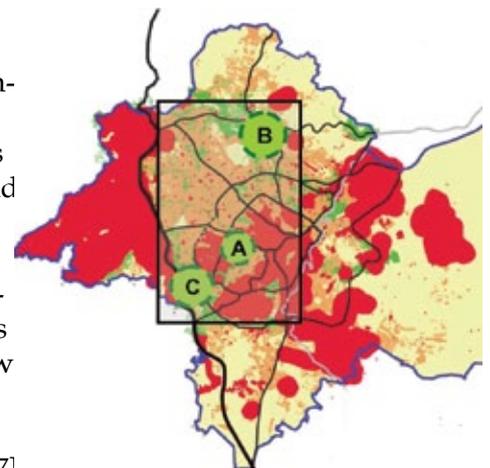
Fig. 4- 11 Amman Plan for Tall Buildings: A Central Parkway, B Northern Gateway and C Southern Gateway, and these zones are over-laid on a another plan which shows in red the areas unfit for locating high-rise buildings, in green, possible areas for such locations (source: GAM 2007, Interim Growth Strategy HDMU Development Manual, Amman, p. 8)

(total area of the four tower zones is about 30 km², they demand a revision of the existing planning legislation (law No. 21 for the year 2005)to provide appropriate legal basis for any future implementation of the master plan to avoid the random planning of towers, even in residential quarters, which could strain the infrastructure and bring about noise and congestion, for in stance some recent erected skyscrapers (Jordan Gate) were con structed in an area which is far too small, thus putting a huge strain on the surrounding streets and fabric [Abu Ghazalah 2008]

4.1.5 Major Influences Affecting Present Street Profiles
Zoning regulations: these divided plots according to size into four categories, last updated in 1979 that decided on physical form, the type of use, permitted heights, building setbacks and usage densities and other physical controls.
- Type A (which constitutes around 80% of all current land use regime) plots are minimum 900 m², allow maximum 39% building coverage and minimum 5m to the front boundary, 7m at the back and 5 on the sides
- Type B (750-900 m²) allow 43% coverage and at least 4 meters to the front boundary, 6 from the back and 4 to the sides
- Type C allow up to 51% coverage, front and rear setbacks of 4 meters, and 3 meters on the sides
- Type D (up to 200 m²) allow 55% coverage, have 3m front setbacks and 2,5 meters at the rear and sides.

The buildings now (mainly residential) were constructed in the center of the plots, not developed on the boundary walls. In Amman oftentimes plot usage along a street could change suddenly, for example from residential to commercial use, through connections or bribery, which affects the streets and existing uses (the new usage intrudes or its scale is incompatible with the residential use of the rest of the street) leading in many cases to resident's relocation because of the created inconvenience [al-Faqih 2009].

Plot Prices: As commercial plots were too expensive for small business people, it was cheaper to open a shop on residential plots, often as part of residential buildings. Although they contributed to the establishment of much needed food establishments, catering to daily needs, they were given only temporary permits. Changes to land use from residential to commercial have in general adversely affected the quality of the built environment.

Rent Control: a law (originally issued to protect people who rent houses) that did not allow property owners to raise the rents, had been in effect since 1982 and was abolished only in 2010, has so far safeguarded the physical fabric from serious changes such as demolitions but has not been conducive neither for proper maintenance and upgrading nor for the landscaping of the immediate context. It also prompted people to stay in the same house for long periods of time.

Legend
- Residential
- Commercial
- Industrial
- Gardens
- Service
- Office

Fig. 4- 12 Land-use plan of Amman city
(source: courtesy of GAM)

<u>Users' Settings</u>: in residential streets users encroach on the front gardens (under the pretext of renovation and making adjustments) by extending parts of the house to gain more space thus effecting changes to the street's profile without conforming to building rules which results in temporary or permanent structures like garages that later would transform into shops etc, or would add new decorative elements like using red roof tiles to cover the new structures leading to disparities in the spatial characteristics and form [al-Faqih 2009]. Residents also plant the public sidewalk in front of their properties each individually and without municipal control, with whatever species of trees they want, although it adds much to the beauty of the streets, the often low-canopied trees not only block pedestrians' passage and obstruct the view and pedestrian route, but sometimes affect the street uniformity.

Land-use
Existing land uses can be divided into the following categories:
- Residential   (1)
- Commercial   (2)
- Industrial   (3)
- Office   (4)
- Services   (5)

Residential: residential use makes up most of the uses in Am-

man, densities are low in West Amman due to urban sprawl.

Commercial: the biggest concentration of commercial uses are in downtown Amman, in Sweifieh (our district chosen for analysis) and along major streets

Office: biggest concentration of offices are in al-Abdali (where a new downtown is being established) and south of it, between the 2nd and 3rd circles, also along major corridors like Zahran Street (the artery bounding Sweifieh) from the north

Industrial: Industrial uses concentrate in five major locations, most of them are located in the south whereas one is located to the north-east of Central Amman

Services: services are distributed all over greater Amman, a higher denisty is found in the central area.

4.1.6 Traffic & Circulation Problems in Amman:
• **Vehicular Traffic**

Over the past six years growth of vehicular traffic in Amman has risen by more than 10% per annum, and is forecasted to continue to do so. The reasons for this, apart from normal population growth, urban sprawl, heavy urbanization and rising incomes, have been the reduction of the importation costs of vehicles and ongoing population shifts due to regional unrest, added to this are the relatively low fuel, registration and vehicle operating costs in Jordan [TMMP 2010]. Since 1999, overall vehicle registrations in Amman have more than doubled, this has translated into a dramatic rise in traffic levels across the network, noise and air pollution levels. In 2003, 46.5 per cent of households in Amman had a private car, compared to 35.9 per cent for Jordan.

Cars in Amman have become an absolute necessity rather than a luxury; this is due to underdeveloped public transportation infrastructure that could provide alternatives to car usage. All this has transformed Amman into a highly congested and polluted city where it is increasingly difficult to drive and almost impossible to walk [al-As'ad 2005]. The whole road network is overloaded, the situation is even worse at peak hours, especially during the summer months when affluent vacationers from the Gulf region and Jordanian returnees flood into the city. City streetscapes are dominated by parked cars and there is an acute shortage of off-

Fig. 4- 13 People choose to walk in the street as it is more comfortable than on the obstructed sidewalks, fig. 4- 14 showing the mixture of pedestrian and vehicular traffic in the old downtown of Amman

street stopping areas for taxis and shared taxis. In the past, the part most congested with traffic in Amman was indisputably the downtown of Amman, but now that commercial centers have formed in different parts, especially in West Amman, and many services also moved out, it has taken much of the pressure out from the city center. Today traffic congestion areas in Amman are spread all over the city

• **Pedestrian & Cycle Traffic**

Pedestrian planning in Amman has long been neglected in the agendas of transportation planning as efforts were concentrated on vehicular traffic and the expansion of the road network which has become a barrier to pedestrian movement and community social cohesion. Planning for pedestrians translated often into creating touristic trails in the old downtown. When inquiring about data related to pedestrian planning in 2008 from the Transportation Department in Amman, it has been unambiguously exclaimed: "we aren't coping with cars to cope with pedestrians". Walking in Amman is unpleasant due to exhaust fumes and noise which trigger serious health problems and affect exposed building surfaces. Pedestrian infrastructure is almost non-existent despite the mild year-round weather that makes a city like Amman ideal for walking most months of the year, and many areas are densely built with a mix of uses, these inherent assets haven't been exploited. Walking is dangerous and uncomfortable as the conditions for pedestrians are abysmal, with rare crossings, oftentimes only in form of littered pedestrian bridges. Pavements are often broken, interrupted, full of potholes or blocked by parked vehicles [Al-Asad 2004a]. Continuous construction activity accompanying economic growth and the rise in real estate values prompt people to resume construction until saturation of the allowed maximum floors is achieved, this in turn leads to visual pollution of adjacent streets and their blockage by construction materials, debris, that are left indefinitely during and even long after construction works have finished. Lack of provision of any kind of screening shields leads to additional visual pollution.

In 2008, approximately 68% of the traffic accidents in Jordan took place in Amman. These included 206 fatalities (27.8% of national figure) and 5607 injuries (40.3% of the national figure). The accident statistics reveal that the majority (60%) of fatal accidents in Amman were pedestrian-related (124 pedestrian fatalities).

Amman has been lacking in urban public open spaces, urban parks, gardens and recreational centers. To compensate for this, the practice has been to create planted areas within traffic circles. public plazas or green strips within road medians. However, these lack provision of adequate and safe pedestrian access, so pedestrians are forced to fight through traffic since there are no controlled crosswalks.

Another big problem with pedestrian systems is that they aren't interlinked, but are often interrupted by major traffic arteries.

Fig. 4- 15 Man on wheelchair forced to use the driveway as sidewalks are dysfunctional in Amman, often obstructed and full of cracks

Property owners, residents and shopkeepers alike, take liberty in encroaching on the driveway by placing various objects in the street in front of their properties to "reserve" a space and prohibit any cars except their own and those of their clients from parking on what is indisputably part of the public realm. The same property owners tend to plant low-lying trees in the middle of the sidewalk, again invading the public right-of-way, by hindering pedestrians from walking. This is an obvious indication that pedestrian life is almost non-existent and sidewalks perform merely a decorative function.

Cycling is non existent in Amman city, except for leisure, which is practiced only on some residential streets in front of the house, or in secured enclaves like the Sports City. No infrastructure has been provided for in this matter. Amman is also a hilly city, which makes it hard to depend on cycling in the older quarters. The western quarters on the other hand could be more appropriate for this mode.

• **Public Transportation**

Public transportation lacks popularity in Amman as the transit system has operated under the sole jurisdiction of the Public Transit Regulatory Commission which adopted an approach that did not result in a modern integrated public transport service which serves the needs of a broad cross-section of the population. As a result, it is seen as the poor man's means of transportation, and is exclusively used by captive users. If people have the money they buy a car or use taxis [al-As'ad, 2004a], a survey has shown that even 30% of households with a monthly income of 300 JD or less also opt to maintain a car rather than use public transportation and its daily hassle [Tarawnah 2009]. This low popularity is due to the underdevelopment of passenger transport in Amman, mainly buses, especially in view of the size of the city and because passenger transport has been lacking a well-structured hierarchy of transportation modes and services; so no rail-based high capacity passenger transit transport nor suburban commuter rail services of any kind are in place, terminal locations are unsatisfactory and facilities generally are very poor. The majority of public transportation trips continue to depend on smaller vehicles and car-based services especially regular and shared taxis. Also support and organization of the sector has been lacking, whereas the funding apportioned to transport projects have up till now been very limited [GAM 2010].

The current system can further be described as:

• Fragmented and not well-planned, with a network too small to cover the urban area
• Not responsive to mobility needs
• Lacking characteristics of modern systems, including timetables, reliability, route coverage, safety and comfort

All the above factors have led to a low mode share of public passenger transport in Greater Amman (about only 14%, but if in-

cluding Regular Taxis it is 35%. The private taxi occupies about 18% of all modes, followed by shared taxis (*serveece*), minibuses and buses respectively [GAM 2010]:
- **Bus services**: performed by conventional large and medium-sized buses on fixed routes along major routes
- **Mini buses**: operating on fixed routes on a hail-and-ride basis, they are predominantly under individual ownership
- **Serveece Services**: Shared taxis (up to 4 passengers) operating on fixed routes, from a fixed point in the city to a designated neighborhood, suburb or other destination. They can pick up and stop upon passenger's wish, but should not deviate from the route, they are predominantly under individual ownership
- **Regular taxis**: Private metered yellow cabs

• **Parking Situation:**
There is a high provision of on-street parking in Amman, generally off the primary road network and largely within residential neighborhoods [GAM 2009]. Absence of parking restrictions or poor enforcement of laws in general, results in long duration parking and hence conflicts with residential uses. Parking is largely indiscriminate, obstructing footways (vehicles parked across them) and double parking is also common which exacerbates congestion. The situation is better on the primary road network where parking restrictions apply along key sections of the highway network to ensure traffic movement is as efficient as possible.
In contrast, provision of public off-street parking is limited, usually facilities are in poor condition, unattractive, with gravel or concrete surfaces often in poor repair, some are in the form of informal parking lots with unpaved surfaces, especially those located in Central Amman are in bad standard. Parking structures are seldom user-friendly, no landscaping is provided to better integrate them into the urban scenery or to make them more attractive to the users, also pedestrian paths through car parks are unsafe as they are poorly marked

• **Modal Split:**
The overall trend in modal splits has remained quite consistent since 1985, only a slight drop in taxi and *serveece* use could be observed; also the proportion of pickups and vans has increased little. The predominant mode of transport in Amman has been the motor vehicle exemplified by the private car. The vehicle trend in 2005 was 52% for private vehicles, 19% for taxis/serveece followed by pickups and vans (13.5%). The modal share of public transport has remained at 5.1%, followed by heavy goods vehicles that represented only 2.7% of the total traffic. [Diagnostics Report, Amman Urban Transport Study 2006]

• **Road System and Functional Hierarchy:**
In Jordan, many authorities are involved in highway design. Roads falling within a particular municipality's boundaries are the responsibility of the Municipality staff who are usually as-

sisted by more experienced staff from the ministry of Municipal and Rural Affairs and the Environment. Within the Municipality of Amman, the Road Design Department, a part of the Directorate of Design undertakes minor design works generally involving upgrading of existing facilities. Major design works are carried out by national/international consulting firms. In the absence of local design standards each authority tries to achieve the design that best fits its needs and requirements. A Traffic Plan for Amman was drawn up in 1999, followed by a diagnostic report prepared as part of the Amman Urban Transport Study in 2006. With the emergence of the new Master Plan, it was decided in November 2007 to shift the responsibilities of managing and regulating the public transportation sector within the geographic boundaries of the Greater Amman Municipality from the Public Regulatory Commission (PTRC) to GAM, so that it could better integrate the development of passenger transport with the development of the city, this resulted in the creation of the new Public Transport Department at GAM, which meant that GAM has now become responsible for all planning services, regulations and management related to passenger transport. Also in an attempt to further restructure the transport functions Transport Directorate is being established under the office of Deputy City Manager for Public Works.

4.1.7 Previous Studies & Plans

One of the earliest studies related to urban design was carried out by the "Amman Urban Region Group" which dates back to July 1979 in which the situation of streets in Amman had been analyzed and guidelines proposed.

The analysis at that time pointed out the lack of hierarchy of circulation, the neglect of pedestrian networks and placing residential plots onto collectors and major thoroughfares and the interruption faced by residential areas by high intensity vehicular traffic. Furthermore it pointed out the lack of urban public space and the lack of provision for children in form of neighborhood parks that are located within walking distance from the residential areas or schools.

As the city at that time was concentrated within the central area, the study pointed out the acute shortage of parking and the traffic congestion caused by through-traffic in the city center that was compounded by the lack of loading and unloading facilities for the firms and businesses, which led to unloading on pedestrian sidewalks, which in turn interrupted their business and the pedestrian movement. Similarly, the lack of areas for Taxis and *serveece* to discharge their passengers, also obstructed the traffic flow.

It criticized the building codes that required only one parking space for two dwellings for the categories C and D and exempted buildings from catering to parking garages if topographic conditions wouldn't allow their construction. In the new district shopping centers emerging at the periphery, parking provisions

SATELLITE TOWNS

URBAN GROWTH CORRIDORS

COMMITTED DEVELOPMENT

AGRICULTURE

TOPOGRAPHIC CONSTRAINTS

SALINE DESERT SOILS

MINERAL CONCESSION

AIRPORT NOISE CONTOUR

GREATER AMMAN BOUNDARY

AMMAN-BALQA REGION

JORDAN VALLEY AUTHORITY
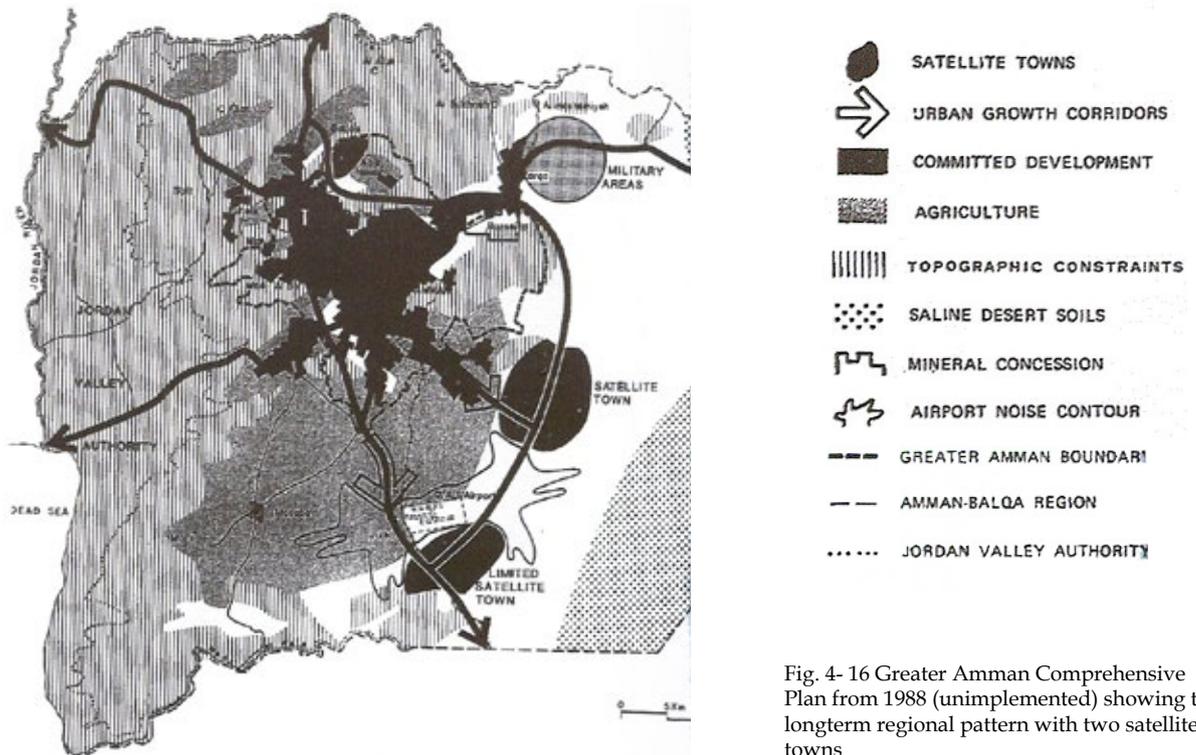
Fig. 4- 16 Greater Amman Comprehensive Plan from 1988 (unimplemented) showing the longterm regional pattern with two satellite towns
(source: GAM 2008, p. 66)

were not included in the original development plans nor were the shops required to provide parking as a prerequisite prior to obtaining a merchant or building permit. Furthermore, the fees that had to be paid in case someone doesn't provide parking facilities were much less than the capital costs of providing on-plot parking and thus were ineffective in providing alternative parking solutions.

Among the main given recommendations was to reduce the circulatory system as a percentage of gross land use in a neighborhood from (20-25%) to (15-18%) and provide all new subdivisions with a minimum of 2 to 5% open space and designate 5 to 10 dunums of vacant land within existing neighborhoods as public open space, encourage the private sector's participation in the creation of public use facilities like small parks and parking facilities.

In the city center, creation of a pedestrian mall with sidewalk-cafés was recommended and a greater diversity of shops in the central area had been encouraged. Although some recommendations were implemented, like constructing parking facilities in the downtown, many of the neighborhood and city level recommendations did not materialize and the same problems described in 1979 are being echoed over thirty years later.

The last integrated transport study was the Amman Comprehensive Development Plan from 1988 (the previous strategic master plan prepared for the capital by Dar-al-Handasah). It attempted to steer growth by proposing a "preferred regional settlement pattern" which identified key urban growth corridors, long-term agricultural lands and suggested two satellite towns (all of which were located within what is now called GAM). Furthermore, the

plan pointed out the absence of design standards for minor roads in Amman, as well as the absence of a classification system (a road hierarchy) by which the function of each road is initially defined to achieve minimum journey times. Accordingly, the report proposed a five-level hierarchy for the streets, whose definition is based on criteria like adjacent land use, access control, speed, and junction type and traffic control measures. It suggested and defined the following hierarchy:

- **Expressways (110 km/h)**: national roads designed to cater for the longer distance movements between major centers of population, to allow for high-speed free flow conditions, no frontage development should be permitted and access should be controlled by entrances and exits at selected points so as to minimmize any interference with traffic using these roads

- **Primary Roads (80 km/h)**: are major roads linked to the express way systems at a limited number of junctions. They should be located so as to facilitate access between major commercial and retailing centres, and concentrations of urban population. Frontage development on them will be minimized and restricted to major land uses. If proposed, a service road, minimum 6m wide should be provided and segregated from the main carriage way with a median not less than 1 meter wide. Sidewalks adjoining the service road will be constructed to a minmum width of 5m. Parking/waiting will only be allowed along the service road. The primary roads will connect to expressways by means of grade separated interchanges

- **Secondary Roads (60km/h)**: provide a link from the primary road network to residential and employment areas. Frontage development will be permitted, although parking/waiting will be extensively restricted to maintain high traffic capacity. Nearby sites with good access to the developed areas should be selected for the provsion of off-street parking. The secondary roads should not divide independent residential or employment areas. High capacity signalized junctions should be provided to connect the secondary roads to the primary network. At some locations flyovers or underpasses can be justified for through traffic along the primary road. Junction with other secondary roads should be controlled by traffic signals or roundabouts. Wherever possible the secondary roads should have a central median to physically separate the opposing flows and to provide refuge for left and U-turning traffic

- **Collector distributor Roads (50km/h)**: form the main internal road network of each independent residential area, and connect it to the secondary road on its boundary. The lowest grade in the hierarchy where public transport vehicles can be allowed to travel. Parking re-

strictions will be only there where traffic safety is affected; connections with the secondary roads will be by means of priority junctions, with crossing movement prohibited if safety or capacity would otherwise be detrimentally affected. Collectors should interconnect by means of priority junctions with no restrictions on vehicular movements; same as with their connection with access roads, these roads will be wide single carriageways capable of providing on-street parking while maintaining high traffic capacity. The road network should be designed to discourage through traffic from using these streets and intruding into the residential areas.

- **Access Road(30km/h)**: final link in the road network, providing access to individual dwellings and places of employment. On-street parking and waiting will be permitted for visitors. Access roads will be single carriageways, with two direct or in direct connections to the collector distributor roads. Very short access roads maybe cul-de-sacs, with a minimum turning radius of 15 meters. Cul-de-sacs to be avoided on steep hills.

The plan further detailed the individual design elements of the road network, including carriageways sidewalks, medians, cross slopes, right-of-way, horizontal and vertical alignments, junctions and spacing of junctions, and even provided drawings of typical cross sections. It additionally provided guidance on how to upgrade existing roads, so that they fall within the categories and classification described above.

According to the guidelines, any junctions between the existing secondary roads with primary roads would necessitate an update, which would result in the introduction of grade separation. Consultants appointed by GAM for the new Master Plan, explained in an interview conducted in January 2008, that although the plan drawn by Dar al- Handasah of 1988 was very good, too much time had elapsed before the recommendations were indeed about to be realized so it lost its momentum and never got implemented.

4.1.8 Transportation Objectives & Policies as Expressed in the New Amman Master Plan & the Transport and Mobility Master Plan for Amman

4.1.8.1 Objectives
The New Master Plan

Although up till now policies generally adopted for the capital have been traditional road expansion, road widening, the construction of more intersections, tunnels and more bridges, (the last of which was the Abdoun Bridge which opened at the end of 2006 forming the last part of Amman's ring road), it has finally been realized that a city that has become a major business and commerce center and the destination of most commuter traffic, with high population growth and uncontrolled urban expan-

sion, requires a plan that will guide its development, to make it less dependent on the automobile. Hence the new master plan (i.e. the Amman Plan) was drawn up to guide growth in Greater Amman until 2025 by featuring three different planning scales: the metropolitan scale, the planning area scale and the community scale. It commenced in 2006 with community-level plans that included among others, the Amman Plan for Tall Buildings, Corridor Intensification Strategy, the Airport Corridor Plan and its major components were released in mid 2008. Transportation, especially public transportation makes up an integral part of the plan which calls for a sustainable framework for the development of Amman

The Master Plan objectives related to transportation have been:
- Densification along the city's major corridors with a variety
  of densities but within strict transportation and urban design
  guidelines, in an attempt to direct the city's growth towards a
  "smart growth"
- Establish targets for modal splits
- Establish a street hierarchy and classification, and a recom-
  mended cross-sectional layout for city streets
- Establish a strategic role for a modern public transit system
- Establish a parking by-law policy

The Transport and Mobility Master Plan
The second concrete step has been the commissioning of the Transport and Mobility Master Plan (TMMP) which builds on the Amman Plan, and is intended as a more detailed strategy for transportation to develop the multi-modal transport demand model, allowing various strategies to be tested. As part of it, the municipality conducted a comprehensive transport survey in Amman to establish key transportation characteristics and relationships, these included Transport Counts, Journey Time Surveys, Household Survey and Origin-Destination Surveys. The household Survey involved about 9300 households, to find out their daily movements, modes of transport used, including walking, private vehicles and public transport, as well as the trip times. Among the transportation targets of the TMMP is to al-low 40% of all jobs in Greater Amman to be located within two kilometers of a major transportation node by 2025, to increase the proportion of personal travel made by public transport from 14% to 40% and to decrease the average journey time by public trans-port in peak hours from 45 minutes to 30 minutes [GAM 2010].

4.1.8.2 Policies
• The Amman Plan's Most Important Policies:

The Corridor Intensification Strategy (CIS):
It is a community scale plan that aimed in large at hindering ur-ban sprawl, increase density along some of the city's major cor-ridors, which will make use of transit viable, and transforming their character into streets that will "define" the city. Emphasis is to be put on mixed-use and vibrant shopping streets that are

pedestrian-orientated by improving pedestrian infrastructure and improving pedestrian linkages to adjacent neighborhoods, but also to devise one major axis to become a "signature street", Zahran Street that extends from the 1st to the 7th circle is foreseen in this role [GAM 2007].

The corridor intensification strategy gives detailed specifications for ten separate but interconnected corridors intended for intensification, which will determine the streets' profiles and nature like building height limits, building envelope standards and parking requirements. Interestingly, it is stated that the planned CIS corridors will cater to high-income households and individuals with high levels of automobile ownership and use. To this end, the requirements for parking are greater and with higher standards than in the past be; according to the strategy, parallel parking along main streets and local roads should cover demand in addition to private parking provided on-site (preferably underground). As only some of the corridors will have a BRT line operating along them, reduction in parking requirements is foreseen for these [GAM 2007]. Shared parking for mixed-use developments along primary corridors has been suggested for uses with different peak use periods. In areas of increased historic value (closer to the city center), the CIS has called for conserv-

Fig. 4-18 (left) Rendering showing a section of Zahran Street (a major arterial) between the 5th and 8th circles which is foreseen for intensification in the new master plan and is envisioned as a "signature street" with mixed-residential use, high-densities, framed public realm, and pedestrian shopping streets,
Fig. 4- 19 (right) Zahran street, current state
(source: GAM 2007, pp. 4 & 66)

ing the most valuable building heritage along a corridor, and for cooperating with private landowners in order to accommodate adaptive uses that will bring life back to the streets while remain compatible with the old existing structures all at the same time [GAM 2007].

In order to reinforce the streets (corridors) as primary public spaces, the CIS plan has called for differentiating between access for pedestrians, parking and servicing. Principal pedestrian entrances to be located off major roads, while parking and servicing should take place off minor streets or lanes to minimize their impact on the public streetscape. In addition, build-to-line has been proposed in association with mixed-use commercial and residential commercial zoning, even along some public walkways and stairs so that the buildings and bases create a street wall at a pedestrian scale framing the streets in a consistent manner.

In order to improve linkages with surrounding neighborhoods, the CIS strategy has called for creating mid-block pedestrian connections (publicly accessible but privately owned open spaces) on an incremental basis. These are foreseen within larger development parcels and in form of pedestrian landscaped mews.

Devise a Road Hierarchy

The new Master Plan has also introduced a new "conceptual" road hierarchy to systematically describe the physical and operational characteristics of each type of roadway, but it doesn't specify the speeds along these streets, the hierarchies are intended as preliminary designs indicative of the concepts & standards intended, the size and capacity of some of these transit corridors, in addition to their planned transit provisions, and differentiate between: expressways, major arterials, arterials /transit, collectors, service alleys, local accesses and minor collectors (see figure 4- 22).

The Metropolitan Growth Plan (as Part of the Amman Plan):

In the last ten to fifteen years the city has grown primarily through outward expansion onto undeveloped land and at an overall low density of 5 persons per dunum. Planners have recognized that the lack of any intervention could result in the filling of most of the metropolitan planning area by 2025 and in the loss of most of agricultural land as residential development would continue to grow haphazardly which would cost enormous sums and is unsustainable.

The new metropolitan growth plan drawn up in 2008 was intended as a guide to more detailed planning for the anticipated
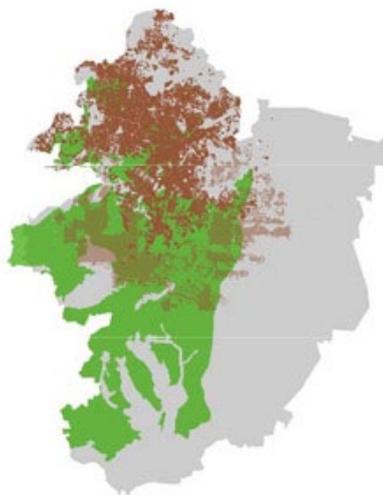
■ Current Built-up Area (2008)
■ Urban Expansion (2025
■ Agricultural Land

Fig. 4- 20 The growth scenario chosen for Amman to contain the projected population growth while conserving a big portion of agricultural land is based on densification + intensification + limited expansion and achieves an overall density of 15 persons per dunum
(source: GAM 2008, p. 69)

Fig. 4- 21 Paradigm shift in the new masterplan towards mixed-use Development
(source: GAM 2008, p. 133)

Parking prohibited

Parking permitted

Parking permitted

6 or 8m

16 or 18 m

22 m

Service Alleys
No Public Transit

Local Access
Limited Public Transit

Minor Collectors
Public Transit within Mixed-Traffic

Parking permitted according to regulations

Parking permitted according to regulations

24m to 40m

40m

Major Collectors & Arterials
Public Transit within Mixed-Traffic or
Dedicated Lanes

Arterials, Transit Roads
Public Transit within Mixed-Traffic
or Dedicated Lanes

Fig. 4- 22 Road hierarchy/functional classification system as proposed in the Amman master plan and was updated in April24, 2008
(source: GAM 2007, pp. 25-26)

tion and intensification, but also by designating new settlement expansion areas, both within the defined urban envelope, and in limited primary growth areas outside of it. 55% of new housing units within the urban envelope will be located in settlement expansion areas.

The MGP, in addition to showing the projected future locations of new roads, public transit corridors, major natural heritage sites, designates areas for more intensive mixed-use development, the so-called metropolitan corridors and metropolitan growth centers. The foreseen metropolitan corridors are three: the existing airport road west of the city center, Sahab al-Mouwaqar Corridor and the proposed Amman Development Corridor that is currently under construction to link the airport with Zarqa city. These will be mixed-use corridors serving both, primary traffic and high-order transit, will define major gates to and from Amman, will be relatively green in character, linking major parks and recreation facilities, act as by-passes to facilitate through-traffic around the city. One of the corridors, namely Sahab al-Muwaqqar will serve the industrial heartland of Amman as a major economic conduit, another will also link the places of employment west of the city center which will be reconstructed to expand its capacity with service roads on both sides.

They will further act as anchors linking several planned Metropolitan Growth Centers together which will be established at the their intersections (see fig. 4- 23). The centers will combine a variety of residential, institutional and commercial land uses combined with vibrant public spaces and act as gateways to Amman, they will be served by both motorways and by high-order public transit. The MGP is aimed at achieving a smaller urban imprint to save more agricultural land and cut more expenditure on urban infrastructure. It is based on both the intensification of vacant land located within built-up areas and the densification of exist-

Legend

 Metropolitan Corridor

 Metropolitan Growth Centers

━━━ Roads

┅┅┅ Railroads

▪▪▪▪ Proposed Roads
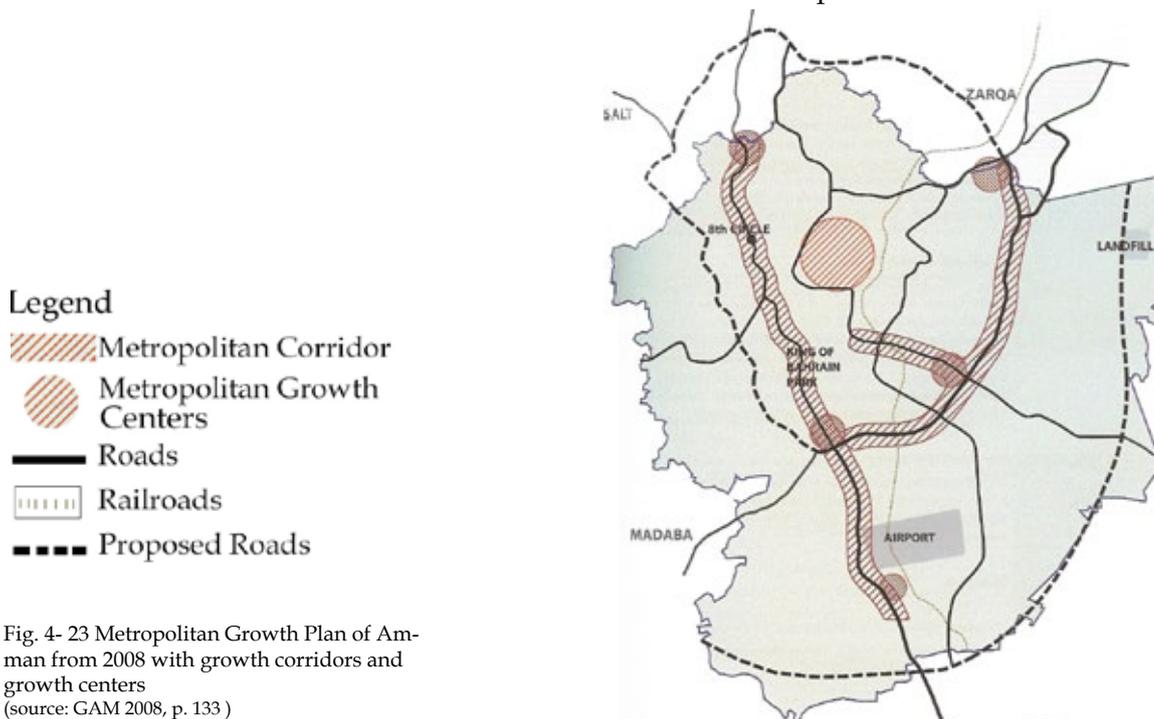
Fig. 4- 23 Metropolitan Growth Plan of Amman from 2008 with growth corridors and growth centers
(source: GAM 2008, p. 133)

Amman population growth to 6,500,000 in 2025. It seeks to focus 45% of future housing development within existing built-up areas (in which 40% of land is still vacant) through both, densifica ing built-up areas, in which growth is largely contained within the Amman Development Corridors, but it allows spill-overs to occur within limited areas

The Employment Plan as Part of the MGP:
The Amman Metropolitan Growth Plan has drawn up an employment plan (see figure 4- 10), which is based on the earlier devised "Amman Comprehensive Development Plan of 1988" and is in line with it.

The plan provides for two major types of employment: export-based and population serving employment. The former to be located in extended business parks, industrial areas or large office districts, the latter to be located mainly within the mixed-use metropolitan growth centers and metropolitan corridors and will be planned in detail at the scale of area and community plans.

Like its predecessor, the plan supports the concept of a compact urban form which locates employment land within or adjacent to the urbanized area and residential areas, it also calls for adding more land supply for land-intensive businesses and it even retains the employment locations devised in the earlier plan to continue providing businesses with locations either in or adjacent to existing settlement built-up areas by encouraging intensification. The new plan calls for accommodating future employment by providing enough land supply within "primary growth areas". It retains centrally located employment lands for future employment use and promotes portions of these areas as business sites to be utilized by the knowledge sector.

It calls for studying the old downtown to assess its viability as an employment area and calls for including potential connections to the new downtown Abdaly and opportunities for new mixed-use office and commercial uses. To avoid ad-hoc and more scattered business locations especially in the annexed areas of Amman, the plan consolidates and designates concentrated areas of existing businesses operating in unzoned land and will prevent future approvals for employment uses outside of these designated areas. The plan mentions that GAM will ensure adequate infrastructure servicing and transportation and transit provision to the designated employment areas.

• **TMMP's Most Important Policies:**
Enhancing Public Transportation
TMMP's strategy towards enhancing transit services includes the following:
- **Design of Light Rail** (three high-capacity rail lines) serving cen tral Amman, will serve as level one public transit network
- **Design of a BRT** network (in two phases, 3 lines in phase 1, two lines in phase 2), it will be the first rapid transit system in Amman that will run along Amman's busiest corridors. It was designed with the help of a specialized global company, namely
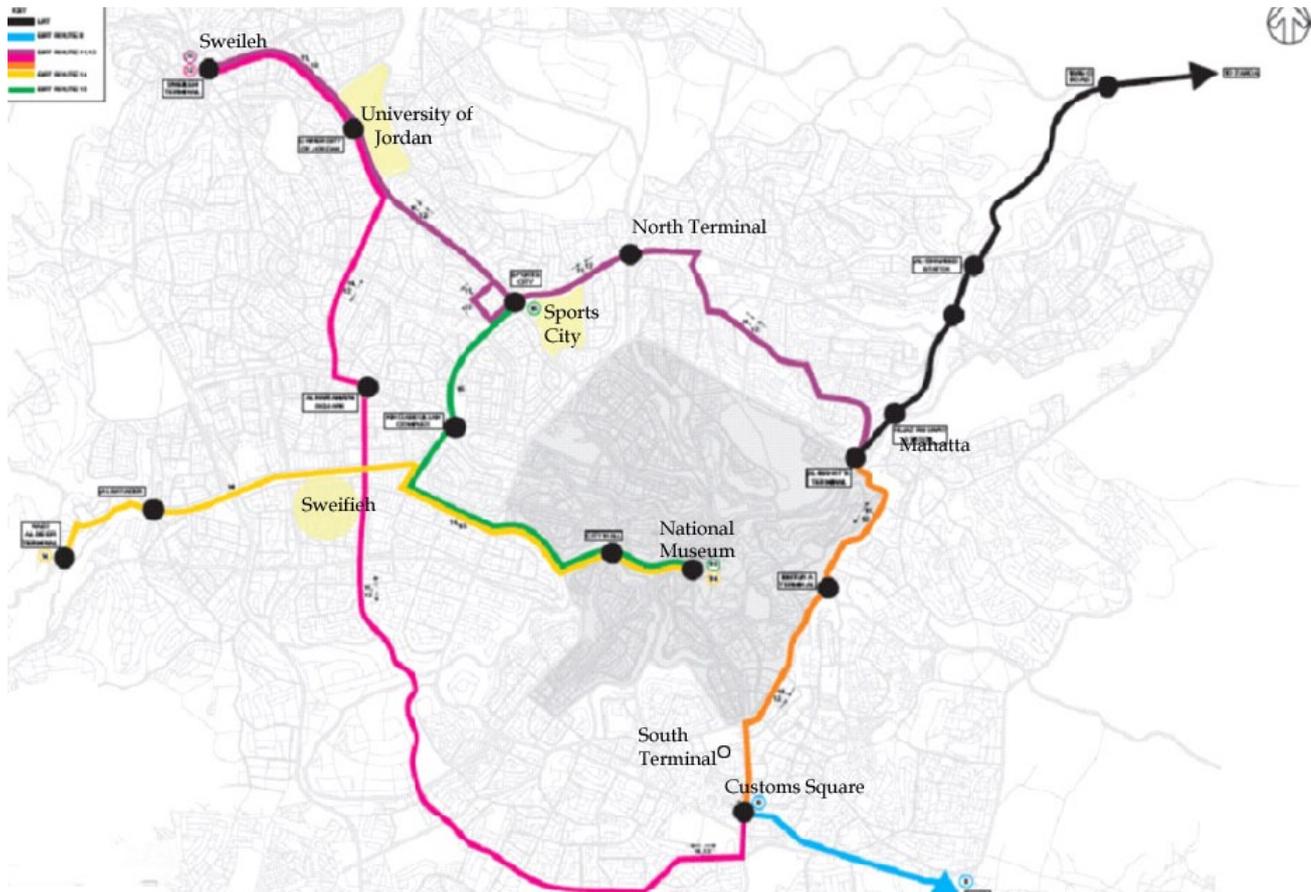
Fig. 4- 24 BRT lines operational by 2015
(source: adapted from GAM 2010, p. 79)

Steer Davies Gleave, which has been awarded a contract to start implementation, its operation is foreseen for 2012. The BRT system (in phase one) will run along three corridors covering 32 km, similar to the model of Curitiba, its buses will be run ning on exclusive lanes separated by 2 medians, and running at a three minute intervals at peak hours. The BRT system is meant as a supplementary Level 1 Public Transport network designed to integrate fully with the LRT. Routes for the BRT have been chosen according to highest levels of demand for passenger transport:

Line1 (approximately 15.5 km) connecting Sweileh Suburb via University of Jordan and Sports City to Mahatta Terminal (along Queen Rania Street), intended to be operational by 2010, this route has one of the highest demands on public transportation since it serves the University of Jordan campus and nearby colleges.

Line 2 (approximately 6.9 klm)–this partial orbital line will pass along a variety of land uses and connects the central area (Ras il Ain) in downtown with the new CBD (Abdali) and Sports City (its importance will intensify as the new retail development Limitless takes place)

Line 3 (approximately 7.8 klm) connecting Customs Square in Muqablain and Mahatta

To reinforce the new hierarchical approach, the above-mentioned core level1 network will be supported by the following:

Fig. 4- 25 An exemplary "typical scene" of the public realm with landscaping, urban furniture, with movement and frontage areas that prioritizes pedestrians, as recommended in the TMMP for the city center of Amman (source: GAM 2010, p. 89)
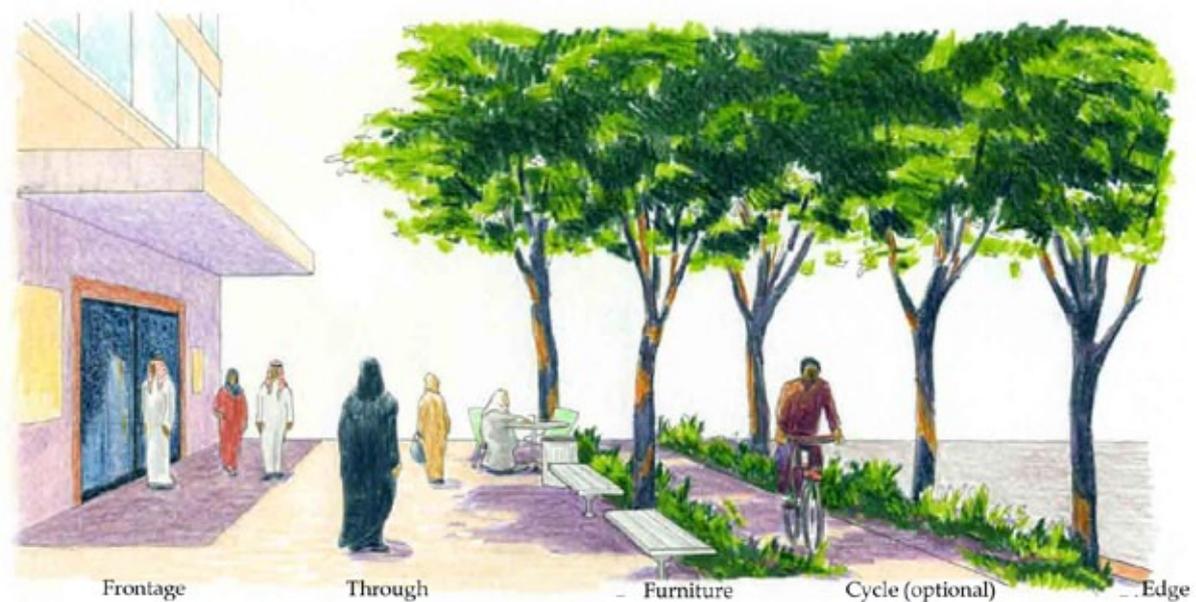
- **Design and implement a range of Level 2 services**, which will provide supporting radial and orbital routes designed to integrate with the Level 1 network. These will be operated either by conventional full size buses or by BRT vehicles operating on both segregated and non-segregated highway (partial BRT)

- **Design and implement a complementary non-core network of Level 3 bus services,** served by conventional buses and mini-buses designed to fill missing links and serve local and longer movements around Amman not covered by the levels 1 and 2 core srevices

- **Develop a "hub & spoke" service of level 4 networks** that are not covered by conventional bus services to connect residential areas with both major and minor interchange points on the core LRT and BRT networks, this will take place by restructuring the existing bus, mini-bus, *serveece* services so that they complement the other systems and be part of the "feeder system". They will also serve in the inner center where conventional buses cannot, because of the narrower streets and hilly topography by means of white Taxis or mini-buses

At some interchanges Park & Ride facilities at the peripheries will also be provided so that more people can embark the fleet. It is suggested that regional buses coming from outside Amman would have interchanges integrated with LRT and BRT to reduce congestion in the city center [GAM 2010].

This strategy that is to be introduced in Jordan for the first time, aims to stabilize, reduce or suppress the generation of car trips, either by increasing the comparative costs between using the car and alternative transportation modes, or by reducing the supply of available space for cars through measures like parking restrictions or public transport priority lanes. Since such a strategy had been absent in Amman, the TMMP recommends starting with soft measures like introducing fuel and Taxi price increases and new fares for public transportation.

Pedestrian Strategy:

The TMMP seeks to prioritize pedestrians above all other modes and increase the proportion of trips made by walking by improving pedestrian accessibility, coordinating it with public transit routes (BRT and LRT), creating direct connections (desire lines) and adapting pedestrian infrastructure to the hilly topography of Amman and its hot climate in Summer by providing networks that better traverse steep gradients and are protected by trees and vegetation to provide necessary shade during Summer months. Upgrading existing streets to better accommodate pedestrians, provision of appropriate pedestrian crossings, introduce push button demand at pedestrian signals are also prioritized and complemented by improved ways for travel information dissemination like creation of special websites and internet kiosks with travel information.

The Pedestrian Safety Strategy states the following objectives:

- Identifying high pedestrian crash zones/corridors and developing effective solutions to enhance pedestrian safety.
- Coordination with the Higher Safety Committee and other agencies.
- Studying pedestrian bridges, understanding the reasons behind their underutilization, and relocating the underutilized ones to more meaningful locations.
- Design, implement and evaluate some model (ideal) pedestrian pathways.
- Influencing driver and pedestrian behavior by conducting traffic awareness campaigns and penalizing the violators of traffic safety regulations.
- Focus on school children's traffic safety in cooperation with the Hikmat Road Safety Organization and the Royal Health Awareness Society (KAFA Program).

The City Center Strategy

The main aim behind this strategy is to improve the environment in the city center and make it pedestrian friendly with areas to support social and cultural activities, enhance public transportation so that it encourages tourism in an attempt to regenerate the local economy. The tools to achieve this are to reduce through traffic from the downtown, create controlled parking zones, provide opportunities for increased economic activity around major transit hubs and pedestrianize parts of the Downtown and link them up with streetscape works within the vicinity of the Roman amphitheatre and further across to the Citadel.

To this end also, the plan has devised principle pedestrian improvement areas, in addition it has shown a "model" street cross section of an exepmplary public realm that prioritizes the needs of pedestrians and cyclers (see figure 4- 25).

Other TTMP strategies include the "**Safety Strategy**", the **"Road Network Improvement"**, the **Parking Strategy**, the **Freight Transport Systems** and the **Intelligent Transport Systems** (ITS). The Safety Strategy aims at speed and accident rate reduction

through engineering as well as education, training and publicity initiatives. Engineering schemes focus among other things on signal controlled junctions, local highway realignment and foresees traffic-calming in residential neighborhoods, safe zones around schools in addition to local pedestrianization. The Road Network Improvement Strategy aims at adding roads to support new developments, directing the expansion of the city towards the east as well as improving key road based corridors and the junctions along them to reinforce the road hierarchy.

The city-level parking strategy aims at balancing provision of long and short-term parking provision in a way which maintains the economic viability and vitality of Amman, introducing centrally located short-term parking like for example in the city center, whilst placing long term parking opportunities at the periphery. Also it aims at implementing controlled parking zones in key locations surrounding important areas in Amman: like West Amman, al-Abdali, the Downtown.

The freight strategy primarily focuses on identifying the central delivery cordon, identifying key truck routes in and out of the city, reinforcing the truck ban times and introducing a freight consolidation center that facilitates the delivery of goods to the city center. The ITS Strategy addresses congestion (traffic management, flow optimisation and restraint), addresses public transport (reliable service and information to passengers), pedestrians (additional and improved at-grade pedestrian facilities) freight (journey optimisation and access management)

This is planned to be done, among other things, through investment in additional systems including real time public transportation tracking and service information, signalized junctions and new mid-block signalized pedestrian crossings, variable message signs to deliver traffic and travel information to interested agencies as well as the travelling public.

4.1.9 Evaluation of the City-level Interventions & Plans in Sweifieh:

 - For the first time in Amman, public transportation improvement and pedestrian infrastructure improvement have been addressed and tackled so thoroughly. Although the planning approach and objectives state doing away with car-based planning and bring sustainable transportation to the fore, there are some marked contradictions between some objectives and the actual planned policies. The reduction of automobile dependency is one such example. This is most evident in the Corridor Intensification Strategy where it is stated that the strategy is aiming at attracting the well-off people that own more than one car, and therefore the design has opted to enhance the parking requirements so they facilitate parking and therefore the ownership of multiple cars. Also, not all corridors chosen for intensification have planned transit lines along them. This will undermine the strategy as a whole, for the public transit should be the backbone of these intensified corridors, which are aimed to reduce sprawl through a more compact spatial structure. High-density together

with high car-ownership and usage are incompatible as they tend to bring about traffic congestion rapidly, even if vehicle use per capita remains relatively low [Barter 2000]

The same applies to the locations of concentrated job centers, locations for high rise towers, and the metropolitan centers. Locations with high towers should conform with the jobs concentration and the mixed-use growth and expansion locations and must be integrated with a high order public transit. When comparing figure 4- 10, 4- 11 & 4- 23, it is obvious that many of these locations do not correspond with each other. Too many "high density"centers will result in difficulty in their servicing by public transport.

Furthermore, traffic calming on the city level has mainly been referred to when talking about safety around schools and its application is only foreseen to limited stretches of streets. City-wide traffic calming has not been pronouncedly mentioned. Policies related to speed limits are not clear either, whereas improvement of pedestrian crossings is mostly mentioned in relation to improving the location of pedestrian bridges. At the time of the research, more detailed area and community neghborhood plans were still not available.

4.2 QUARTER & STREET LEVEL ANALYSIS

4.2.0 Introduction

As explained in chapter 1, Arabic cities in the colonial, post-colonial and modern times were affected by western planning models; that were either imposed by colonizers or embraced by the local ruling classes, who blindly believed they were synonymous with progress. As a result, the urban fabric outside the old city cores has been mostly Western-like, and planned for the automobile. The example of Sweifieh is intended to show typical problems that are faced in many such suburban quarters in Amman and modern neighborhoods of Arabic cities where most trips depend on the automobile. The new districts in Amman have been mostly built on the American urban models, where outer subdivision streets are overburdened, whereas residential cul-de-sacs are under-utilized. This case study analyzes two quarters that form the Sweifieh district: a mixed-use commercial center, and a bordering residential quarter in the south.

4.2-a A Commercial Quarter & A Residential Quarter in al-Sweifieh

The choice of this district for detailed analysis is owed to its being one of Amman's better-known shopping districts, and that despite being a relatively new and very vital area of the city, its streets and urban spaces have suffered from increasing congestion and urban deterioration. Also, it is here where the first pedestrian street in Amman was conceived in 2007 which was meant to become a demonstration project for other areas to follow in Amman. Almost four years have passed since then, although Wakalat Street can be estimated as a successful urban public space, it is feared that if the area around the pedestrian

zone is left much longer to its own devices without redevelopment or rehabilitation, it could threaten the viability of the only pleasant street in this commercial part. South of the commercial quarter lies the residential part of Sweifieh which despite being "calm" is very auto-dominated.

4.2.1 Physical and Spatial Analysis
• Location
Sweifieh is a relatively new neighborhood that has formed throughout the 1980s and 1990s on a vast expanse of arable land. It has been conceived on the model of American suburbs where displacements are dependent solely on the private automobile.

Sweifieh lies in south-west Amman, outside and west to the city's inner ring road between the 6th and 7th circles. It can be divided into two larger parts, a northern part which is mixed-use, predominantly commercial but also including a residential component, with an area of .8 km², and a larger southern part which is purely residential covering an area of 1.2km².

From its four sides, Sweifieh is bounded by busy arteries with heavy and fast traffic. These separate Sweifieh from quarters that are mostly residential, but with a services component. To its north, Zahran street separates it from the residential quarter Um Uthayna (west) where recently the two tallest skyscrapers in Amman (approx. 150m high) were constructed. From the east, Princess Alia bint al Hussein Street separates Sweifieh from Abdoun al-Shamali, to the south it is bordered with Queen Zein al-Sharaf, and al-Diyar, from the west Abdalla Ghosheh

• Population / Social Situation
Sweifieh is among quarters that formed thanks to influx of petrodollars sent by Jordanian immigrants working in the Gulf. A study in 1988, just before the first Gulf War, was conducted to houses/ apartments in Sweifieh. It revealed that 50% of al-Sweifieh houses stood empty during most of the years in the 80s, and

were owned by Jordanians who worked in Kuwait and other Gulf States who used these houses only for vacationing. Only during the first Gulf War, many were forced to return, and hence the houses started being permanently occupied.

Today's Sweifieh's residents are mostly of the middle-income strata and most of the houses are owner occupied. Population density in the residential area is 65 p/ha, whereas in the commercial area 31p/1ha (excluding jobs).

• **Significance**

The history of Sweifieh is not very well researched, but mosaic remnants belonging to an ancient church have been recently discovered in the area (at the corner of al-Yanabee' and Tareq al-Jundi), which if better exploited could become a major archaeological attraction and a reminder of the area's history.

Fig. 4- 28 Mosaics found in Sweifieh, probably belonging to an ancient church's floor that stood in Sweifieh in ancient times (source: GAM)

Sweifieh has become one of the first upmarket commercial centers in the new extensions (suburbs) of Amman in the 1990s and has enjoyed much popularity among mid and upper classes as it has housed some of the city's first better known international fashion brand-name shops and properties of highest real-estate value as well as slow-food and fast-food restaurants, and one of the first night clubs. It has also been a popular hangout for many young people belonging to the middle and upper classes.

Since 1999, the main competition to Sweifieh area has been the introverted-style shopping malls. This new building type in Jordan has found much acceptance among Ammanis, since in addition to providing internationally acclaimed brands all under one roof, it caters to a wholesome family environment that is pedestrian-friendly and safe at the same time, something almost extinct and a luxury in Amman.

For these reasons, the shopping mall has become a threat to the street front shopping areas [al-As'ad 2004]. One such mall was even opened in the heart of Sweifieh itself: Al Baraka Mall which offers high-end consumerism and is the largest shopping mall in the area with over 25000m² of retail space and underground parking for 350 cars.

In answer to this new threat, the axis known originally by Salim al-Qudah Street, was converted to Wakalat Pedestrian Street (literally: Brand Name Street), the first and only such street in Amman.

When interviewed in 2008, Dr. Rami Daher, the principal of TURATH Consultants, the company chosen by Greater Amman Municipality to draw up the design for the pedestrian street, explained that the project's main design objectives were to reinvent public life in the city, produce the "Anti Mall Space" by creating a "Walkable Street" and a recreational promenade that encourages pedestrian life in Amman and wins back public life from shopping malls to the "real streets " of the city with brand shops and cafes. A further objective of the planners was to create a street that is inclusive, welcoming people from different social

strata of Amman in an attempt to induce social change and fight the clash of social classes in the Jordanian society.

This brought additional social groups from all over Amman and shopping tourism, local and international to this area.

The residential section of Sweifieh on the other hand is seen from the perspective of residents and visitors as a nice, leafy and quiet place to live when compared to other residential neighborhoods in Amman because of the light traffic volumes. But this holds true only to the inner calm streets, whereas residents facing the main collectors, which separate the residential quarter from the commercial center, suffer from high levels of air, noise and visual pollution. This is attested by the fact that many houses in this street have been put up for sale especially around the recently built shopping mall.

• **Street Pattern / Urban Structure:**

The street pattern in the commercial part of Sweifieh in the north is a grid system, but not a strict one.

There are only few connections between the inner access streets and the collectors surrounding them, internally the streets have a higher connectivity in form of a "modified grid" in which, in addition to crossroad intersections, three-leg T intersections often occur, which produce an irregular grid with a large amount of variety. The terrain of the commercial district has a marked slope
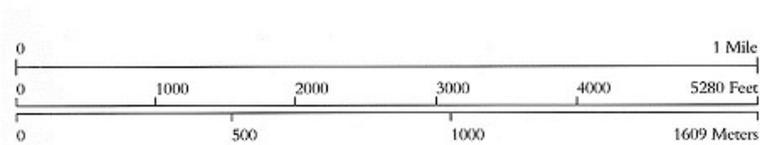
Fig. 4- 29 Figure ground plan of Sweifieh commercial center in the north and Sweifieh residential quarter in the south

in an east-west direction, which puts Wakalat Street at the bottom level in the west.

In-between the eastern and the western parts there are many vacant plots that are mostly used for parking purposes. Although a lot of activity and jobs are concentrated around Subhi al-Omari Street to the east, the pedestrian street "Wakalat" in the west and the surrounding streets, with the later developed shops, serve as another activity generator. In fact, the two parts seem spatially disconnected.

Four cross streets connecting to Wakalat have their end-sections also pedestrianized, most often only their very ends. Usually a roundabout is placed at the end of the driveway, as a drop off point for passengers targeting the pedestrian street and a parking ot is designed. The pedestrian street with its shops, cafes and restaurants is also a major activity attraction.

Subdivision planning in Amman has not generally restricted vehicular movement within neighborhoods. The residential part of Sweifieh, which lies south of the commercial part, comprises a subdivision typical of American suburbs, that consists of loops and fewer cul-de-sacs, although it has more of a "combined" street layout pattern, where orthogonal geometry, here an oblong grid, is combined with the usual loops and cul-de-sacs. Similar to the commercial area, the streets are more connected internally than with the surrounding distributor roads. Some of the loops have formed additional connections over time, so they lost their 'loop character'. Most houses are situated around the loops, fewer on cul-de-sacs, but there is a considerable number of houses (most often apartment blocks) on the busier and noisier collector streets. Most streets are straight and perpendicular to each other

Street Typologies
Residential Streets:
one can differentiate between 4 types of streets:
- Access cul-de-sacs
- Access loop
- Minor streets
- Access collector
- Major collector streets
Commercial & Mixed Streets:
- Pedestrian street
- Major collector
- Minor collector (commercial /mixed-use)
- Minor streets (commercial / mixed-use)
- Marginal access street (service road)

• **Type of abutting developments:**
Buildings abutting the mixed commercial streets in Sweifieh vary in styles, they consist of a mix of both modern buildings and but also older-style building, clad in white stone)with shop front streetscapes, Also, residential buildings in the mixed district have usually shops or services in their ground floors or

Sa'eed al Mufty Street

Fig. 4- 30 (a)-(b) Sa'eed al-Mufty major collector street, mainly residential but recently a mall was built, leading to augmented congestion and noise

Amira Taghreed Street

Fig. 4- 31 (a)-(b) Ameera Taghreed Street, mixed-use minor Collector Street

Ali Nassou7 al-Taher Street
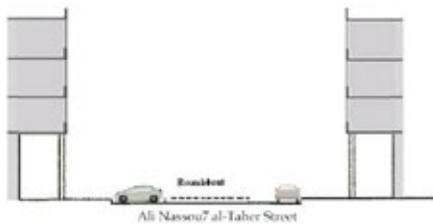
Fig. 4- 32 (a)-(b) Ali Nasouh al-Taher minor commercial street, perpendicular side street to the pedestrian main street Wakalat, it ends
with a roundabout as a drop off point for people targeting Wakalat

Bakheet Issa Street

Fig. 4- 33 (a)-(b) Bakheet Issa, an acces residential loop with two to three story buildings, leading to a school

Fig. 4- 34 (a)-(b) No name dead-end residential street, with three to four story high apartment building
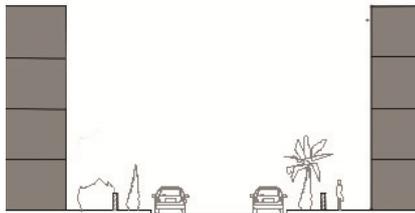
Fig. 4- 35 (a)-(b) al-Alaa' residential acces loop, with four story high apartment building

a

b

c

d

Fig. 4- 36 (a)-(d) Different types of housing in al-Sweifieh

ground and first floors, while apartments or offices are on the upper floors. Most commercial buildings are 4-5 stories high.

Buildings abutting the residential streets are villas and large single-family houses, mostly two-three story high dwellings, or four-story apartment buildings in beautiful white limestone.

Their fronts are usually set back four to five meters from the street; usually a lower wall (1-1.2m boundary wall) delineates the end of the plot and separates the front garden from the sidewalk and many dwellings have parking garages as part of their front gardens, although on-street parking is also common.

In addition to the green inside the front and back gardens, often residents plant trees in the middle of the sidewalks fronting their houses, which often interrupts pedestrian walking, this is another proof of the dominance of the car in the residential areas, where sidewalks perform more of a decorative function. The streets are usually calm, only cars that travel at relatively high speeds can be heard. Residents in Sweifieh usually know their neighbors, but there is no sense of community.

• **Structure of the Urban Block**
As mentioned before, the zoning practice in Amman has been

Fig. 4- 37 Figure ground plan with showing land plots

to divide building land into strict use categories depending on the quality of planned construction (according to plot sizes) land was parceled out into categories A to E, A plots had the largest area and least density, whereas E Zones had (comparably) the smallest plots and the highest allowed density (building coverage). The residential quarter's plots in Sweifieh belong mainly to category B with plot sizes between 750 and 900 m², with houses set back more than 4m from the front, 6m from the back and 4 m from the sides, category B also means higher residential taxes, which translates to more regular urban services, such as street cleaning and water supply, than elsewhere.

The commercial quarter of Sweifieh on the other hand has rectangular-shaped perimeter blocks varying in size and number of buildings, usually each block is two lots deep; the outer northern blocks are more longitudinal (440 x 102m) with their long sides orientated onto the main street (Zahran), which decreases connectivity of the commercial district with its surroundings. The inner blocks are smaller, with sizes of (115 x 55m). Although many buildings form continuous building lines along the commercial block edges with direct frontage to pavement, there are too many gaps in form of empty plots, which contribute to visual chaos, interrupted and weak definition of the streets and exposure of side and rear walls as well as the often poorly developed block interiors that most often serve as shabby parking lots or service yards.

According to zoning regulations, the setback provisions in normal commercial areas should be 4 meters at the rear of the plots. Social control and sense of community in the residential neighborhoods is weak, partly because of lack of any community facilities and areas where people could socialize together in the neighborhood.

4.2.2 Functional Analysis
4.2.2.1 Land Use:
The mixed-use center has a big concentration of retail, commercial and service establishments, but with interspersed residential use. Here retail activities, offices and fast-food outlets prevail, in addition to beauty saloons, restaurants, well-known cafés and hotels.

In addition to street level retail, there are indoor shopping centers; one bigger mall on Sa'eed al-Mufti street, namely al-Baraka mall and another one, Sweifieh Avenue on Salah al-Zhaimat street.

The second zone is almost exclusively residential, interspersed with schools, some NGOs and religious edifices (mosques and churches). The residential zone has also a local supply of shops where everyday needs can be covered, but this small supply of services is not in its center, but rather south of the residential area along a collector street and some inner streets.

The quick expansion of the commercial center of Sweifieh onto the main axes separating the commercial district from the residential one has introduced buildings of incompatible scale and

Fig. 4- 38 Land-use plan in al-Sweifieh district, , residential use in yellow, commercial in blue office in purple, service in grey and green for an empty plot with bushes
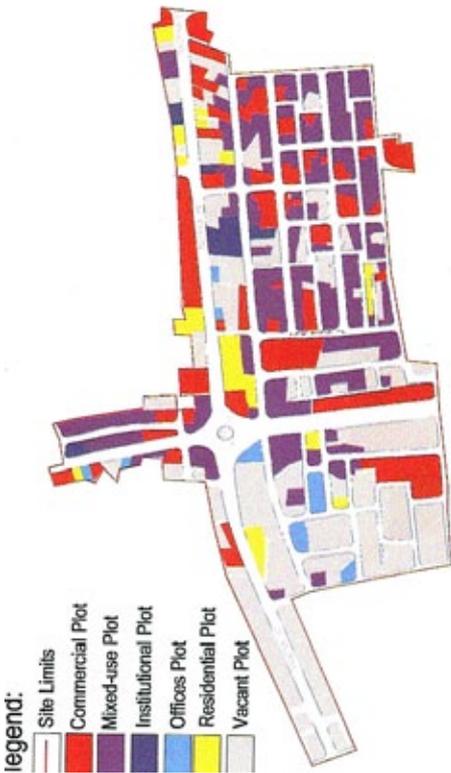
Fig. 4- 39 A detailed commercial study of the northern mixed-use part of Sweifieh (source: GAM 2008, p. 19, annex 14
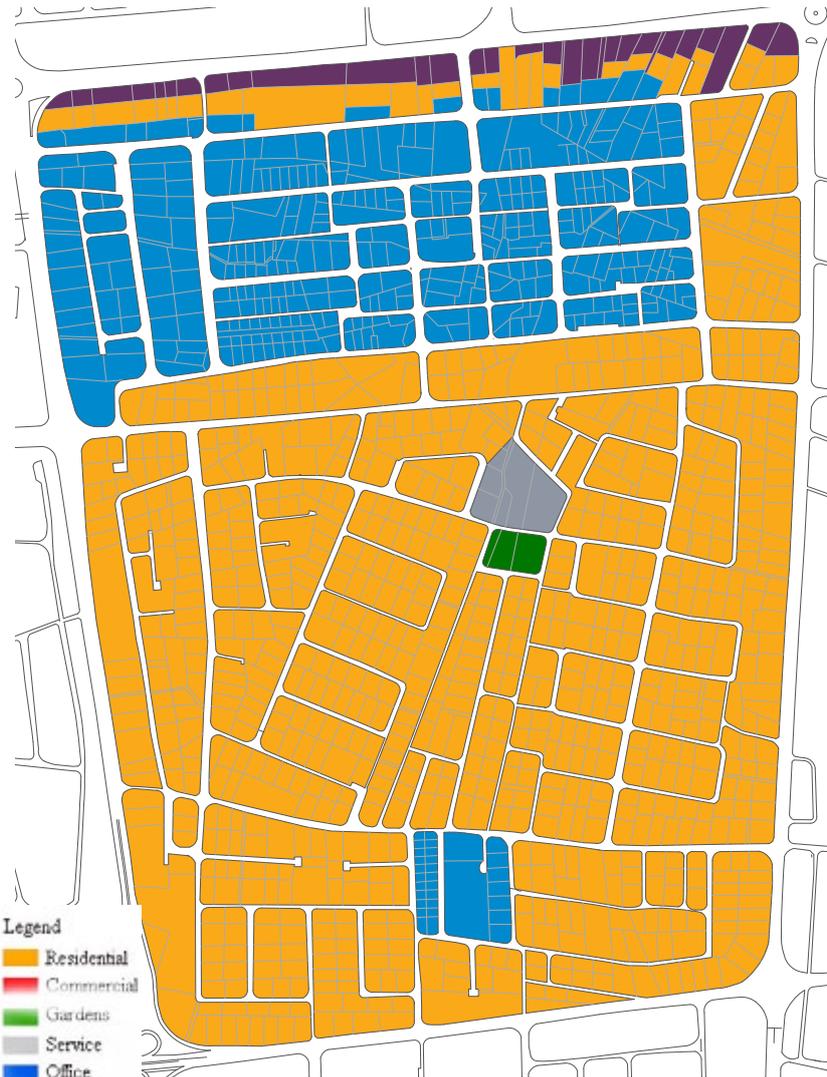
uses to some collector streets that were previously predominantly residential. So now houses and apartment buildings aren't only subject to noise and pollution from the high volume of traffic on the collector streets, but the construction of buildings of the height of this shopping mall has greatly reduced light and ventilation from the surrounding residential plots, and additionally increased traffic flows.

There is almost a complete lack of public open spaces, so no parks or playgrounds or play fields exist despite the abundance of empty plots.

Roman remnants have been discovered in the area when construction work of a new house began, otherwise there are no cultural facilities in the commercial center of Sweifieh.

4.2.2.2 Traffic & Environmental Management
• The situation before intervention:

Car Traffic
Traffic chaos, paralysis and fights between street users especially drivers were the norm all through the commercial area at certain

times of the day especially around noon and in the evenings, the commercial activities of the bordering retail outlets were generating much traffic, but parking-search traffic and poor driving habits were the main causes of congestion, noise, pollution and bottlenecks. Added to this, the area was a popular hangout among young people, where spirited young men liked to drive around show off their cars, honking and flirting with walking and shopping girls. All this made it a much unpleasant experience to drive through the area. As most of the commercial streets housed high-end boutiques, it had been argued that in Sweifieh the first world met the third world [al-As'ad 2004].

The situation in the mixed commercial district further deteriorated when a fast food chain was licensed a permit to build at one of the entrances to Sweifieh. This, in turn, rendered the life of residents in the surrounding area intolerable. Since the restaurant did not provide enough parking spaces, its clients parked their cars in the residential streets nearby, causing heavy congestion due to heavy activity and parking-search traffic most hours of the day.

In the residential areas on the other hand, the levels of car traffic have been much lighter, but the speeds have been high as the carriageways (especially of collector streets) are very wide. No traffic calming measures have been introduced except for standard speed humps.

Pedestrian Traffic

The situation of pedestrian infrastructure in Sweifieh has reflected that of many similar districts in Amman and other Arabic cities. Comfortable and safe walking even for able pedestrians has been impossible, whereas no provisions of any kind for the disabled have been introduced.

There are no interconnected pedestrian paths, the sidewalks, be it in the commercial area or the residential, were (and still are)in a very poor state, poorly paved, disrupted, discontinuous and with sudden drops in levels which made it very hard especially for shoppers to move from one building to the next. Most

Fig. 4- 40 A commercial street in Sweifieh before any intervention
(source: al-As'ad 2004, photo by Bissiso, Jumana)

of the streets' curbs in Amman are built with a 25 cm height or even more, which is much higher than international standards (15-18cm). Oftentimes the pavements were further obstructed by wide-trunked trees planted in the middle of the sidewalk, not leaving enough space for a person to pass by. As a result of the above mentioned reasons and because the sidewalks are too narrow, especially in the commercial part where pedestrian volumes can get high, people prefer to walk in the driveway and tend to jay walk, as there are no designated crosswalks.

The quality of public spaces (streets and squares) in Sweifieh commercial district has been in urgent need of an upgrade as they did not correspond to the quality of fashion shops.

There are many vacant plots in Sweifieh, not delineated by any pavement, which worsens the situation, as pedestrians are forced to walk along those littered stretches that become muddy in the winter and the image of the street was visually polluted by large and unsightly signs covering the commercial buildings' facades. Streets were also not named or numbered.

Parking:

Parking in Sweifieh, like in the rest of Amman and other Arabic cities, was mostly on-street, as there were hardly any other alternatives to park off-street, underground or in multi-story buildings. But as it was completely unregulated and chaotic, it hampered traffic movement in the area; the ability to park everywhere (no police control) and absence of public transit, led to intensive parking demand and to a situation where vehicles parked everywhere and in every conceivable manner and distance from the sidewalk blocking traffic, or even parking on the sidewalks, leaving pedestrians forced into the driveway [al-As'ad 2004], parking at intersections, hindering traffic movement, all-day parking by employees and shop owners who left their cars in front of their shops. Customers, not finding a space in front of targeted shops, would double park or even triple park to avoid walking a few meters, further hampering the flow of traffic and additionally worsening traffic congestion, causing delays and reducing economic efficiency. There was even a tendency among shop owners in Amman to place items in front of their shops to "secure" or unlawfully privatize the space for their own benefit or that of their clients.

Some shops, restaurants and cafés even have valets who take customers' cars and find a parking space for them, this leading at times to violations and car theft. In Amman, the drive-through culture dominates where everyone has to park exactly at their destination and with the least amount of effort.

• Intervention:
Traffic Organization

Sweifieh has been one among three other big urban renewal projects taken on by the Greater Amman Municipality (GAM) that aimed at revitalizing neighborhoods and creating pedestrian public spaces [Ejeilat 2008].

Fig. 4- 41 Bird-eye view of Wakalat before (above) and after pedestrianization (source: JO magazine, issue 53, January 2008, p. 51)

The most important interventions can be summarized:
- Pedestrianization of Salim al- Qudah Street
- Transforming some streets into one-way streets or changing their directions
- Naming and numbering the streets
- Cleaning the facades from unsightly advertisement signs
- Relocating some trees to arable fields on the Airport Road
- Later, constructing a multi-story parking garage at one of the entrances to Sweifieh, provision of a free-of-charge shuttle bus service running between the car park and designated points across the commercial center

Prior to pedestrianizing Salim al-Qudah Street, the renowned Danish expert office in public spaces, Gehl Architects, was commissioned by the Amman Municipality to conduct an analysis of the traffic situation in Sweifieh. In 2005, closure of this street to cars was experimented with during the summer months on a daily basis from the late afternoon hours well into the night [al-As'ad 2005].

Also, before redeveloping the street for good, GAM started a campaign in Amman including Sweifieh that aimed at cleaning up the streets from unsightly signage, in addition to provision of street name signs.

Similar to what took place in European cities in the 1960s and 70s, pedestrianization of Salim al-Qudah Street triggered opposition among merchants who feared a loss of clientele. Although the municipality claimed it involved merchants of Salim al-Qudah in the planning process, merchants argued they found out about the scheme only after roadwork had begun. But the merchants' concern later shifted towards the "kind" of people that frequented the street, as they feared that pedestrianization would attract "undesirable elements" to the street, referring to people of lower socio-economic levels, but especially younger men who would frequent the street but could not afford to buy products from their shops. They feared this would, in turn, dissuade the wealthy from using the street as they wouldn't enjoy 'mingling' with other social strata [al- As'ad 2007].

Right at the start of opening the street to pedestrians, police (men and women) were included to watch for order as it was feared that some youngsters would harass passers, especially women, but the police's presence was not intimidating. It was rightly believed by the municipality that these groups would gradually dissipate once many more public spaces were created in Amman.

Intervention: Parking
First, parking along the streets had been regulated, although no obvious parking bays were marked and angled parking was introduced along some streets, especially where shopping malls are located, longitudinal parking along others (absence of marked parking bays) and short-time parking along streets was intro-

Fig. 4- 42 The plan of the first pedestrian street in Amman
(source: courtesy of TURATH Consultants)

Fig. 4- 43 Wakalat Street lit in the evening

Fig. 4- 44 - 4- 48 Design and urban furniture on Wakalat, Sweifieh commercial center
(sources: fig. 4- 44 : courtesy of TURATH Consultants, fig. 4- 48: al-As'ad 2007, original GAM 2009)

duced and limited to 30 minutes. At some point, parking meters along a few streets were also introduced, although they helped much to reduce the number of cars left indefinitely parked during the day, they soon were given up. Big and small-sized parking lots free-of-charge were designated around Wakalat Street as large parking lots abutting Wakalat to the west, were located on empty land at the back of the buildings. Another substantial public parking lot was created at the western end of Princess Taghreed Street (see fig. 4- 49). Other smaller regulated parking lots were distributed on some of the cross streets connecting to Wakalat from the north.

The municipality also cooperated with landowners in Sweifieh, whereupon it was agreed that the vacant lands in the commercial part of Sweifieh and elsewhere can be exploited as additional, free-of-charge parking lots so that more parking spaces are secured for the visitors coming to Sweifieh and other vital commercial and touristic areas. Signage has been placed on these plots with a thank you message to the landowners, and a reminder for the people who park their cars on these lands that it is the goodwill of the landowners that secured them a parking space. Other parking initiatives followed, including constructing a modern multi-story parking on Salah al-Zheimat main street in the eastern part of the commercial district, namely the Plaza Park with a capacity of 750 cars that was completed in mid 2009, the building also accommodates a shopping arcade and services on the ground and first floors. A shuttle bus service running nonstop that collects and drops shoppers at the car park from fixed points that are distributed throughout the area, is also part of the scheme, a sign showing the bus's route and stops is also provided at several bus stops (see figure 4- 50).

Fig. 4- 50 Street map showing the route of the shuttle bus serving the multi-story car park

Fig. 4- 51 The recently constructed Park plaza
(source: GAM 2009, Initial Site Specific Amman Parking Site Assessment, Amman, p. 8)

The Municipality has launched another parking structure, but this time of the automated type, one whose completion is scheduled at the end of 2010 to be located in the western part of Sweifieh opposite Wakalat on land owned by the municipality. All this is believed by the municipality to ease the congestion in this part, and maintain the commercial and economic vitality of Sweifieh.

Delivery:
In Sweifieh delivery and supply times have been restricted to certain hours of the day.

GAM's vision for this area:
The segment of Zahran (the northern artery) between the 6th and 8th circles is envisioned for major revitalization, into a green boulevard lined with mixed use residential, commercial and retail development; it will complement the revitalization and pedestrianization of Swiefieh.

● **Present Situation (existing conditions)**
Car Traffic
Up till now, the only pedestrian zone in Amman is in Sweifieh, and the most convenient mode to reach Sweifieh remains by private car or taxi. Since the mentioned interventions, Wakalat has been transformed into a nice pedestrian public space, although traffic congestion has loosened a little, still, in the evening hours and on the week-end, except for Friday, traffic jams recur especially on the collector streets surrounding the district and the streets closest to Wakalat. Most of the collectors that have been turned into one-way streets have two lanes, but these lanes remain unmarked.

Pedestrian & Cycle Access
Up till now the intervention has been too narrow in scope to improve the functionality of the pedestrian network. The disadvantageous situation of pedestrians (in the commercial and residential quarters alike) has persisted: sidewalks are too narrow

Fig. 4- 52 Parked car obstructing the pedestrian path in Sweifieh

compared to the carriageway widths; walking across the whole area remains uncomfortable and unsafe, also as a result of unco-ordinated and individual pavement solutions. Pedestrians can feel at ease only within the confines of the "pedestrian island"—Wakalat. Wrongly parked vehicles and planted trees obstruct-ing pathways remain, which leaves the sidewalks often unusable for people, who prefer to walk in the driveways instead. Neither marked pedestrian crossings nor refuges exist. In the residential areas, where pedestrian volumes are comparably low, no inter-ventions were carried out, mostly kids could be observed walk-ing to and from school and elderly people strolling in the even-ing (or walking to the nearby mosque), avoiding the sidewalks that are often broken, or crowded with trees.

Concerning cycle infrastructure, it is completely absent.

Parking

As has been already mentioned, at present, parking on the col-lector streets, Abdel-Raheem al-Hajj Muhammad, Paris, Princess Taghreed Muhammad and Salah al-Zheimat Street is mostly on-street in form of parallel parking on both sides of the street with no marked bays and restricted to one maximum stay. A few angled parking spaces also exist, whereas off-street parking is either on gravel sites or in multi-story facilities.

Parking within the internal road network on the other hand, is totally free of charge and is either on-street (parallel parking on both sides) or on empty land (gravel-sites).

Although the whole commercial district is dominated by a sea of surface parking lots and on-street parked cars, complaints about illegal parking along streets have persisted. Despite limitations in parking durations to 30 minutes along many streets, there is no police control and no monitoring, and since the parking is free of charge, the short-term parking becomes all-day parking. The current planning practice in providing every possible parking space on and off-street with the aim to maintain the economic vi-tality of the area, has a reverse effect on the environmental qual-ity of the urban space that is resulting in anti-urban space; as the urban scenery is dominated by wastelands of parked cars. There are no markings that show where to park, this in turn leads to chaotic parking and an unregulated street edge. Where signs ex-plaining where parking along streets is admitted, do exist, there are no interruptions in the continuous rows of parked cars to acquire space for other uses, i.e. tree bases and for pedestrian crossings. Cars continue to park haphazardly, unlawfully, even on sidewalks, and thus interfering with pedestrian traffic in the eastern approaches to Wakalat, where people leave their cars at the roundabout, thus blocking the traffic lanes.

The current tendency in providing free parking wherever possi-ble with lack of law enforcement has led to a situation where the newly constructed parking garages (including those offering a shuttle bus) are underutilized, as people prefer to park on-street closest to their destination.

Urban Furniture

<u>Public Seating</u>: Seating is only provided on the main pedestrian spine, no seating to stop and relax between errands or while shopping is provided elsewhere in the public space, except in form of private indoor cafes.

<u>Lighting</u>: Good lighting for pedestrians exists only on the pedestrian street in form of pedestrian scale lighting and built-in street illuminators. The rest of the district streets are poorly lit with standard light posts with many wires strung between them. Night street life is extinct as shops close with front metal shutters thus eliminating the opportunity for transparency and window shopping at night, streets look deserted.

<u>Surface treatment</u>

Except for the pedestrian Spine and some surrounding short stretches that have been paved with basalt cobblestones, all streets remain asphalted with no accents or differentiation between types of streets.

<u>Planting</u>: Local residential streets are leafy, almost every property has a front garden with different kinds of trees, flowers and bushes, which gives a pleasant impression in general, but there is a lack of using planting or planting strips to highlight continuity of the streets or as buffers, trees mostly found planted in the middle of the pavement on residential streets belong to the spruce tree type. The use of planting as a street design element has neither been used in the business district, where trees are sporadic and different in types and shapes. Here the wide feeder streets, most parking lots, in-block courtyards are bare and no planting is used for shade, despite its potential usefulness in the hot summer months. In the redesigned street, the types of trees chosen for the design are Jacarandas and Albezias.

<u>Special provisions for the impaired</u>: no provision of any kind has yet been considered or applied

Fig. 4- 53 View of the Zahran street from a pedestrian bridge

Traffic calming measures: other than sporadic bumps, no other measures were observed in the area

Other pedestrian amenities:
- Public toilets: No public toilets exist in the area
- Fountains: Neither fountains nor drinking fountains are found in the area
- Historic elements (precedents) and retained historical associations are missing despite the discovered archaeological remnants

Orientation and way-finding:
Orientation is eased in this area through the sole use of streets names. No indication about parking locations is provided, no indication about availability of parking either

4.2.3 Synthesis of the Street Problems in the Area:
4.2.3.1 Problems related to urban structure & urban design:

Connection to the Surroundings:
Sweifieh is weakly connected with its surrounding urban context, it acts as an isolated unit surrounded by busy arteries which interrupt the pedestrian system, people willing to come to Sweifieh on foot from the surrounding districts, means they are engaging in a life-threatening experience. There are several pedestrian bridges over these arteries, but they are not popular among users, because they are uncomfortable, often littered and unusable by disabled people, whereas signalized pedestrian crossings at street level do not exist. If those arteries were redesigned in a way to provide adequate pedestrian crossings (graded or traffic light-controlled crossings), it would encourage people living in the surrounding quarters to access Sweifieh on foot instead of driving to it. Sweifieh could function as a focal point for neighboring quarters for covering their daily needs, the "necessary activities", but also for "optional activities" like urban recreation and social interaction..

Coherence and Imageability
At the moment the whole commercial activity center doesn't act as one. Mere pedestrianization of Salim al Qudah Street attracts

Fig. 4- 54 Many apartments were put on sale after construction of a mall next to residential buildings

Fig. 4- 55 (above) The rear of buildings aligning the pedestrian street, an ugly invitation to the area

Fig. 4- 56 A sea of parked vehicles along the streets and empty lots in Sweifieh

people mainly to the lower part of the district (to one or two streets), but up till now no improvement of the rest of the public space network has taken place to link the different spaces of the Sweifieh commercial district together and attract the people to walk around the whole place. The sloping east-west terrain acts as an additional hindrance that can be solely overcome by means of high-quality and interesting streets.

Visibility of the district from a distance leaves much to desire; entrances to Sweifieh are not well emphasized in order for visitors entering the area, to read it as one, a special place with "own character"

Commercial Streets:

There is a structural and design quality gap between the pedestrian street and its surroundings, which makes it even more difficult to read the area as one. Also the numerous un-built plots scattered throughout the area add to the ambiguity and visual pollution. Unifinished facade lines and the abundance of exposed blank, side and rear building walls with unsightly air-conditioning boxes (e.g. the rear blank walls of the buildings aligning the pedestrian street accommodating service and storage areas) present visually poor and unattractive elevations to the adjacent car park and a poor entry to the pedestrian street.

"Window-shopping" after the shops' opening hours is not possible as the shops have metal shutters on shop fronts which reduces the liveliness on the commercial and mixed-use streets at night. Walking remains difficult as pedestrian paths remain disrupted, whereas car speed limitations are not clear. The streetscape on collector ctreets is dominated by heterogeneous structures of different shapes and heights and cladding materials, zoning laws (or incompatible enforcement) allowing incompatible building types to be built next to each other, i.e. malls to be built next to apartment buildings, high next to low etc. Also they are dominated by vehicles and are weak in terms of soft landscaping and tree-line continuity, with numerous disruptive entrances to basement parking from the street.

There are no opportunities to sit and relax except on the pedestrian street, no pedestrian pockets nor public squares (despite availability of widenings at some intersections) are available for social activities as they are mainly dominated by cars, polluted loud without greenery nor water features . Street life is not equally active during the whole day, nor throughout the whole week, street activity usually is more pronounced in the evenings especially at weekends.

Residential Streets:

Although originally loops and cul-de-sacs were conceived to protect the neighborhood from through-traffic, which they do manage to do, still, the cross-sections of these streets reveal they were designed primarily for the car; they are excessively wide with narrow obstructed sidewalks, which encourage high speeds. Cars drive fast, and the only traffic-calming measure used is the

matabb (road bumps) that are inefficient.Also the loop and cul-de-sac type of streets doesn't encourage walking, walks can be long and boring since interconnectedness is poor and to go anywhere, one must always leave the loop or cul-de-sac via a collector street to go anywhere, pedestrians prefer direct routes.

The location of social infrastructure and retail establishments (and their scarcity) further exacerbates poor walkability and car dependence, since with exception of schools, most social infrastructural facilities are not available and the only existing commercial area within the subdivision itself covering daily needs is not centrally located, but situated farther to the south, which makes it unequally attainable from different points of the quarter and not within comfortable walking distance to expect residents to walk to it. Here the undefined street enclosure, auto dominance and the sense of incoherence stem from overly wide roadways in relation to the narrow sidewalks and from the lack of both, unity in building heights and rigorously planted vegetation that would bring the whole street together.

In-block Courtyards:
Currently the publicly accessible large in-block courtyards in Sweifieh haven't received any design attention: they are dingy and except for some shops are largely underutilized spaces that are currently mainly used for the storage of automobiles. They have an architecturally unarticulated environment with uncoordinated pavements and arcades solutions at ground-floor. These spaces have a big but unused potential that should be better exploited with particular deference to human scale, greened and calmed, this will make up for the missing urban greenery and parks but above all, create tranquil oases complementing the street spaces

4.2.3.2 Problems related to planning and management issues:
- Traffic Calming, road reclamation and cross-section street design for pedestrians are still abstract planning concepts in Amman
- Weak parking monitoring, lack of laws' enforcement
- Misinformation and poor marketing of traffic and parking schemes, the locations of the newly built multi-story parking garages and the related shuttle service
- Lack of cleanliness, waste container distribution in the streets
- Lack of pedestrian amenities

4.2.4 Evaluation of the quarter-level Interventions in Sweifieh:
Evaluation of the interventions in Sweifieh cannot be objective since the intervention was not area-wide. Even if the project was only intended as a first step towards improvement, too much time has elapsed from the moment that Wakalat has been pedestrianized. This put the commercial viability of the rest of the commercial establishments surrounding the pedestrian zone under threat of drying out.
The current state of the district has shown that the new plan-

ning approach is incomprehensive, it is addressing single streets, creating "pedestrian-friendly isolated islands" at the same time making sure that access by private cars to these "islands" and mono-axial pedestrian promenade is eased and ensured as much as possible by provision of maximum parking capacity.

In the short and mid terms, Sweifieh will not be directly connected to the planned BRT lines. This means that other public transportation modes need to link Sweifieh (from various sides) with important transportation nodes and terminals, but this also mean that dependence on the car will continue.

So the current planning strategy that claims to address the improvement of public spaces and encourage pedestrian life in Amman is actually a continuation of previous auto-orientated planning practices that cater for the automobile, replicating the mistakes of European planning concepts from the 1960s that were widely criticized already in the seventies. In its current form, intervention was neither neighborhood-wide nor extensive, it doesn't integrate or interconnect with adjacent residential areas by means of creating good pedestrian and cycle links and hasn't been accompanied by traffic-calming of adjacent streets to the pedestrian zone. This practice lacks a holistic approach and thus is not contributing in any way to lessen dependence on the automobile. This approach reduced walking to a mere free-time recreational activity by encouraging walking along one main axis, but if the trip purpose is other than pleasure, travelers will instantly reach for the automobile, since it remains the only mode that provides the fastest and most convenient way to reach this center.

The current planning approach hasn't approached pedestrian travel as a viable alternative by developing extensive walkable neighborhoods, and thus it hasn't contributed in expanding transportation options. Emphasis on tackling walking as a viable transport mode in itself, a mode central to how people access the city on a day-to-day basis (for serious trip purposes as well as for optional purposes) is needed.

Socially the project has managed to bring the largely stratified popoulation together in one place, although at the beginning it was feared that attracting the poor to Sweifieh will eventually discourage the affluent from shopping in the district, time has shown that this did not take place. It is rather management and design issues of the area that are undermining the area's success. In addition, there has been an abovious lack of any information in the media informing the citizens of any upcoming upgrades and future plans for the area. This lack of transparency and weak community participation in the planning process has left citizens, especially business owners, in the dark eventually leading them to give up their businesses and abandon the area as they fear for their future.

Economically: upgrading the urban environment merely along one or two axes leads to neglect and inequalities in the urban quality on different streets as the pedestrian street becomes the

main magnet in the area, thus leading to the degradation of the less visually and functionally attractive surrounding areas, and to turnover losses of shops lying on them.

<u>Culturally:</u> the project having been initiated in a modern district of Amman, exclusively modern and abstract design features were chosen with some kitschy elements like the kiosk that has been standing empty and disused since the street's inauguration. The design of the street does not in any way attempt to relate or make use of local or arabic traditional street culture. The large-scale colorful paving pattern in the pedestrian street that was perhaps intended to be cheerful, looks good from an eye-bird perspective but does little to the people walking on it. The logo of the project has been criticized by a young professional in an urban-themed Jordanian blog, indicating that "it looks nice but has no relation to the city's urbanism, its people nor culture". Although there is no trace of the logo anymore,

<u>Technically</u>, the project leaves much to desire, the basalt pavers used for the pedestrian zone were not sealed against dirt pick-up and staining, so the pavers looked stained and their colors washed-out soon after the street was inaugurated.
The trees planted are still too small to assess the effect on the pedestrian street.

Summary:
Streets in arabic cities have been greatly transformed, adopting mainly modern, western planning models for urban areas that developed outside the medinas and city centers, without reflecting on their specific context. The traditional streets of historic centers have been characterized by clear enclosure, where emphasis in the commercial streets was more on the outer space than indoors. To this end, shops were small, citizens did not need to enter the shop to buy. Actually most of the activity took place in the space of the *fina'*, where goods have been displayed, where mobile vendors have stood and merchants sat and socialized. Together with the high pdestrian volumes, this resulted in a vibrant and lively atmosphere, a so-called chaos of diversity. Residential streets on the other hand, especially the cul-de-sacs, served often as extensions of the private spaces of houses where also women could be sighted.
In modern districts today, enclosure was replaced with isolated buidlings separated from their street, the width to height ratio has become too large to achieve the feeling of enclosure even in residential streets and although street spaces became larger, the available space has not been judiciously used and streets paces have mainly been dominated by cars. The emerging activity centers in the suburbs have most often been surrounded by wide arterial streets that made it impossible for the residential population of surrounding areas to risk coming by any transportation means other than the car for fear for their lives.

Pedestrian planning was neglected in Arabic cities and this despite the fact that temperatures are mild most time of the year except for a month or two during Summer (especially in the Gulf states), and walking can have a potential to become a vital and sustainable mode.

So it is a shame that authorities in the Arab World opt to cater for the automobile and put pedestrians at a disadvantage, and that even cities of the Gulf states which possess huge financial resources have followed a totally exogenous and unsustainable urban growth development comparable to American cities, investing in extensive road networks of paved highways, too extensive when compared to the land area, accompanied by urban sprawl and the spread of the mega malls along these highways surrounded by huge parking lots.

Nevertheless, the Case Studies have shown some hopes and new approaches. Besides those two examples, awakening towards the need for alternative and more sustainable traffic planning has also occurred in the city of Abu Dhabi in the UAE which has developed the first "Urban Street Design Manual" in the Middle East to transform the existing infrastructure of urban roads dominated by cars into streets encouraging various modes of transport.

As motorization is on the increase, the only way to stop further deterioration of the quality of life in Arabic cities is to accommodate new growth in a way that is less dependent on private vehicle travel. The challenge for modern districts in Arabic cities is to make those suburbs work as well for the less costly forms of transportation namely walking, cycling and transit, as they currently do for the cars. To this end the suburban environment needs to be redesigned in a way to become more walking and transit-friendly, so that it is better able to attract and sustain transit usage. The second approach towards improving the environmental quality of the modern districts (residential but especially commercial) requires measures that will help the different streets' users to "cohabitate" together and to mitigate the effects of car dominance. Mere calming of traffic on some streets or stretches will merely shift the problems but doesn't solve the essence of the problem: the increasing automobile dependence and dominance, that is why a comprehensive approach is needed that tackles both the macro traffic and the micro traffic situations,

The next chapter will show the different layers of possible intervention, the scope of this research is limited to improving streets of existing built-up urban environments.

Chapter V

OPPORTUNITIES, PROPOSALS & STRATEGIES FOR THE IMPROVEMENT AND FURTHER DEVELOPMENT OF STREETS

IN ARABIC CITIES

5.0 INTRODUCTION

All the above analyses clearly show, that if sustainable traffic-calming and management is desired, one that is not limited to short-term and localized benefits, then a radical approach is needed with planning measures that reduce the need for cars and with interventions extending beyond the confines of the local neighborhood. A broader strategy with a bundle of interconnected measures at both the micro and the macro levels is suggested, as city-wide interventions are meant not only to calm traffic but mostly to influence travel choices and reduce the need to travel also by changing land use and promoting other modes of transport, which ultimately could mean a reduction in the total levels of traffic. All these actions that concern engineering techniques and the physical environment should be further distinguished from those that imply social and cultural change and affect community attitudes that are equally important for achieving traffic-calming at a city-wide level [Brindle & O'Brien, cited in Arup Services 2003]. All this requires heavy investment in social infrastructure, effective marketing campaigns, and the mobilization of the population.

5.1 OVERVIEW OF PAST EXPERT RECOMMENDATIONS

5.1.1 Past Recommendations for Historic Centers

Since the earliest studies that have approached the rehabilitation of the *medina*, there has been a general consensus among planners regarding the need to limit the amount of vehicular accessibility to this traditional center if the coherence of its historic fabric and environmental values are to be protected. The need to conserve its pedestrian scale and environment was also soon acknowledged; as this was seen as a safe investment for the future, on the condition that its immediate surroundings are accessible to cars [Van der Meerschen 1972; Bianca 1984; Bouchenaki, Laurent & Strauss 1998]. But the new road networks laid outside were under no circumstance to penetrate the old city, their function was to facilitate traffic around the historic center, various accesses for cars were proposed that would stop outside the *medina*, or slightly penetrate to its periphery, but to the parts least vulnerable architecturally (often in the form of loops or cul-de-sacs to exclude transit connections) [UNESCO 1998].

The international charter for the conservation of historic cities, namely the Washington Charter that was adopted by the ICOMOS in 1987, underlines in its article II that the most valuable feature to be preserved is the "urban form defined by the street pattern and the parcels", any damage to this legacy would compromise the authenticity of the historic city.

An idea that has kept recurring was that encouraging the local middle and upper classes to come back and live in the *medina* (and hence save its houses from deterioration) was dependent on the possibility to park one's car near the house.

On the agglomeration level, recommendations included diverting non-central traffic away from the center by reorganizing it around the central area into a more concentric pattern in order to diffuse concentrations of traffic before they reach the center. The idea was to create several ring roads around the center at successive distances and with different functions. One immediate ring road surrounding the old city would become a distributor for new multistory car parks and for service access into the fringes of the central area. Whereas a second (intermediate) ring road at a somewhat greater distance from the center would act as a bypass, ease transit and lessen the traffic load on the first ring road by intercepting and deflecting vehicular flows away from the geometrical heart [Bianca 1984]

Despite the above early recommendations, none or few of these proposals have seen daylight. In many cases, vehicular traffic has unfortunately been allowed to enter most parts of the historic cities as in Cairo, Damascus and Aleppo (before the intervention), without any restraint and to the detriment of all other users giving ample proof that "civilized" and good quality urban environment in the historic center cannot be achieved if streets are open to unrestrained vehicular traffic.

This does not mean, however, that no street conversions took place in Arabic cities, but most pedestrianization attempts have been isolated cases until now, concentrated on individual streets, namely main axes in the old city with the highest number of historic monuments and patrimo-

nial value, or traffic free developments or stretches of streets in district centers that function as islands surrounded by multi-lane expressways from all sides, which make them not easily accessible to pedestrians and further emphasize the domination of the automobile. So the objectives of such schemes were not linked to any wider framework targeting sustainable mobility or the amelioration of the living environment for the actual local users and pedestrians, nor did these policies correspond to the poorer strata's needs (who comprise the majority in the historic *medina*, most of whom are carless), as they have been mainly geared towards attracting tourists or sanitizing the image of financial or other districts. Otherwise planning has been aimed at easing and fluidizing car traffic to serve higher income people, who live in the new city but still work in the center and who prefer to drive through the historic center by car as quickly as possible in order to avoid any confrontation and mingling with the poor social strata in the streets of the historic city [Margier 2010].
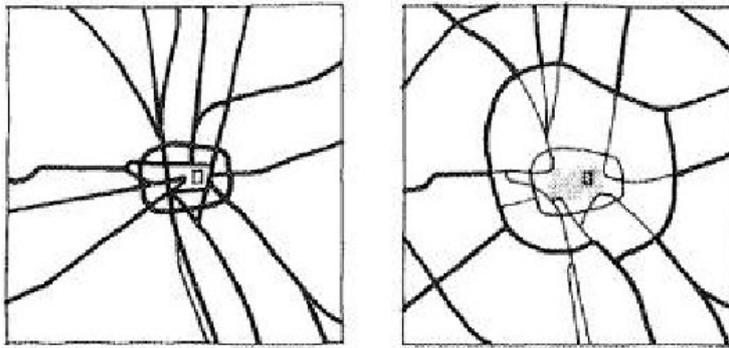
5.1.2 Past Recommendations for Modern Districts

In modern subdivisions on the other hand, experts recommended, as far back as the end of 1970s, to install social infrastructure and urban parks that are accessible within walking distance, to increase the percentage of vacant land within neighborhoods designated as public urban open spaces, reduce the percentage of gross land use dedicated to circulatory systems and encourage the private sector's participation in the creation of public use facilities like outdoor cafés, small parks and parking facilities. Here also, most of these recommendations did not materialize.

5.2 ANALOGIES & DIFFERENCES BETWEEN EUROPEAN & ARABIC CITIES

5.2.1 Analogies

The rapid growth of cities and the advancing motorization in developing Arabic countries confront planners and policy makers with challenges that have faced cities in the industrialized world since the 1950s when congestion and road safety in urban areas had already become major problems.

The ongoing process of suburbanization has transformed many major Arabic cities from monocentrically organized cities into

polycentric structures, in which historic *medinas* (that were complete cities in the past) no longer are the sole "identity bearers" of their cities. Most cities have become highly polarized and largely divided into historic cores and dispersed informal settlements, on the one hand, that usually house the poorer societal strata and are often neglected and deteriorated areas, on the other hand, into planned new urban areas, new towns, satellite cities, gated communities and new CBDs that represent modern life, western lifestyles and mainly house the rich. Unfortunately, today even established institutions are opting to relocate from the city centers in Arabic cities to the periphery because road congestion and gridlocks made their accessibility no longer reliable, which leads to further depreciation of the historic centers and their marginalization. The situation has been further compounded by a growing mall culture on greenfield sites, which is in competition with both: the traditional souks and street-level retail in mixed-use centers. This is analogical to the case of European inner centers, which lost their residents and commercial retail to suburban developments and shopping malls on peripheral greenfields leading to desolation.

It is accepted that the reason middle and high income private households tend to be attracted to the suburbs away from the dense urban areas is mainly the low market prices for single family homes and better environmental quality [Petersen 2004]. The suburban house is seen as a desirable setting for family life as it allows to raise children in a house with a garden instead of adjacent to a wide avenue. After a period of "being in the middle of events" in the city, once people settle and have children, Europeans prefer to retreat to a peaceful place [Scheiner & Kasper 2005].
Similarly, in Arabic cities, most new residential developments that are being built at or beyond the urban periphery, have slogans promoting "healthy, quiet and pedestrian-friendly environments, with clean air and miles of landscaped walking and jogging trails" where also "the car can be parked right at the front door". These residential compounds have emerged as an answer to the demand of the rich who view the city cores as no longer in a position to offer them a high standard of living and the right to walk safely [Florin 2005].
 So despite urban sprawl and suburbanization, in European cities the relatively densely built-up city still dominates in terms of population density and centrality of functions. Although many people live outside the "city", they work and shop within the traditional city boundaries, for it still remains the cultural and social center and offers state-of-the-art shopping. This is because many European cities have maintained a type of semi-centralized settlement structure (where the city center has been reinforced as the "core" in a polycentric city) and although a large share of the trips is by car, travellers are nevertheless enabled to use regional rail lines, linking sub-centers with central urban areas [Petersen 2002].

Although this certainly was helped by favorable, social and demographic changes, European cities have to a large extent avoided the fate of extreme dispersion of American cities (and unsustainable structures), not by accident but thanks to purposeful action and planning efforts and stringent land use planning and automobile restrictive transport policies that aimed at more compact spatial development patterns with an emphasis on reinforcing existing centers and banning greenfield stand-alone malls. Actually the "compact and mixed-use city model" has won a domineering position among European countries that have focused on the reurbanization of the inner city, including the historic centers, to steer urban development inwardly.

Arabic cities have many characteristics that can support sustainable transport but this needs timely steering decisions that make use of the available potential. Similar to their European counterparts, Arabic city centers have developed from earlier compact historic cores that were pedestrian based. The later established colonial centers (facilitated by tramlines) had traditional roadside perimeter blocks that also communicated well with the streets. This compact structure with a good balance of jobs and residences in many Arabic city centers has created good opportunities for sustainable mobility. Furthermore, as could be seen in chapter I, historic Arabic centers provide good conditions for "attractive residential living" as their spatial composition with residential clusters that are functionally separated from the multi-functional commercial core but still located at a walking distance from it, allows residential quarters to enjoy both, functional autonomy and privacy that are helped by the aforementioned filtered hierarchic access of alleys and passageways. The Arabic word for housing is "*Iskan*", and is derived from "*Sakan*" (a peaceful environment shielded from inappropriate intrusions), which depicts the importance of peace and privacy for housing in Arabic muslim cultures. In contrast to the colonial extroverted apartment buildings that are exposed to the noisy streets, the cellular structure of the *medina* and the specific street system have the potential to offer "a house with an internal peaceful garden" in a quiet residential area and right in the heart of a bustling city. This can make residential areas in historic centers competitive with those enclaves at the city's periphery.

The uncontrolled urban growth in Arabic cities has led to urban sprawl which is sacrificing the limited agricultural land that can make resource-poor Arabic countries even more dependent on external imports and lengthens distances and leads to more car dependence, and with it, to social exclusion. It is also linked to the loss of animation in inner cities. Nevertheless, the rapid population increase and economic conditions, have still resulted in dense growth patterns within relatively low-rise development especially in the central city and the peripheral informal settlements. Despite underdeveloped public transportation, high population densities in Arabic cities generate sufficient concentrated transport demand to support good public transport supply (espe-

cially that a large share of the population is poor) and a sufficient customer base for shops and public facilities. Diversity in land use also makes it possible to make less and shorter trips and to combine multiple errands together on a single trip. Historically, Arabic city centers have measured up to this ideal where a diversity of land uses are available at a walking distance. The informal settlements have also developed self-sufficient structures, but the same cannnot be said about the new suburban developments, new towns and planned satellite cities at the peripheries that developed as a response to overcrowdedness of the traditional city: they were planned without any reference to traditional densities nor climatic requirements and are largely monofunctional, hence they are not self-sufficient, unable to attract the poor and middle classes, as they lead to more reliance on private cars.

In view of the finiteness of natural resources, especially oil, and the combined social, economic and environmental costs of automobile dependece, cities around the world are attempting to pursue more sustainable development patterns and travel-reducing urban structures, opting for the compact city model that stresses inward densification. In Arabic cities, where public budgets are low and where the majority of the population is poor, it is even more important to curb sprawl in future development and maintain dense structures.

Meanwhile, it is necessary to keep in mind that with all the advantages associated with the compact model, it also implies much less availability of open space in cities and a bigger risk of more congestion. This means that for the compact city model to be sustainable, car-ownership and usage must be restrained, so that the scarce urban space still available can be efficiently redistributed in favor of other uses and more sustainable modes.

5.2.2 Differences:

The difference in trip generation pattern and modal choice between Arabic and European countries is affected by urban form, spatial development patterns, socio-economic and demographic factors, and by urban policies as well as cultural preferences.

Non-spatial factors include differences in income, trip purposes, age structure, vehicle ownership and social polarization.

In Arabic cities, the social and spatial polarization affect mobility; income gaps even affect the perception of mobility and problems, based on where one lives and to which social group one belongs. As public transportation is poorly developed, the car is seen as a status symbol which has become a cultural barrier that has promoted an auto-oriented mentality, which views public and non-motorized transportation modes as backward and belonging to the poor. The vertical inequality in Arabic cities still persists, unlike European countries where it has been supplemented by new horizontal inequalities beyond classes and strata. Planning has to consider these issues and the fact that the majority of the urban population in Arabic cities is poor. These low-income groups prefer to live close to their workplaces and avoid locations that

are distant from the center or settlements that are not self-sufficient to avoid the high mobility costs.

As shown in chapter I & III, car-ownership levels in Arabic cities are still low compared to Western European levels. Despite this, the rising incomes have the power to unleash the potential for rapidly rising use of private cars. In Europe transport policies have been more automobile restrictive and the gasoline prices have been much higher than in Arabic cities. This is a pressing issue that demands timely action in Arabic cities if current car-ownership levels are to be sustained and controlled. Public policies should emphasize density, restrain the use of vehicles through financial and legislative measures and by making it more expensive in comparison with public transportation. Less cars on roads means more available space for integrating road users, as well as better conditions for establishing car-free developments and conversions in existing communities, which can ensure people's support towards such developments.

Cultural preferences (as seen in Chapter I) have further shown that people in Arabic cities, especially the lower and middle classes, use the streets for a variety of activities and that they favor narrow semi-private residential streets that are protected from strangers, which allow them to function as extensions of their homes, where children can play and women can sit in the afternoon. Furthermore, social cohesion, solidarity and the need for direct contact are culturally, but also economically-based preferences that are essential for daily survival, for instance vendors and cheap-food providers in streets (i.e. mobile restaurants) are needed by residents in lower and middle income quarters.

In contrast to Europe's ageing society, the age-structure of societies in the Arab region is predominantly youthful. This means an increased demand on accessibility and travel to educational and leisure facilities and that if good conditions for non-motorized modes are available, young people will switch to them as costs for this group will play a role, so bringing uses of interest nearer home for this age group will also reduce travel.

5.2.3 The Case for Reinforcing the Historic Arabic Centers:

When European historic centers faced similar outer migration in the 1970s, the approach to handle this problem augmented interest in rejuvenating city centers and transforming them into livable and habitable places where streets were resurrected again for communication and leisure and were made attractive to lure people back to them under the slogan "city center revitalization". The emphasis was mainly on improving the living and environmental conditions of the people that were inhabiting those quarters at the time, rather than attempting to relocate them or replace them by the well-to-do strata. Reinforcing the residential function was seen as necessary, but it was realized that to achieve a long-lasting sustainable revitalization of central residential areas, modernizing housing, alone, would not be sufficient if it

was not accompanied by measures targeting the environmental improvement of the residential environment [Monheim 1977a]. It became also clear, that the survival of the economic and cultural life of city centers, necessitated safe and easy movement of pedestrian flows, and that historic structures with narrow street networks could not physically survive unless volumes of traffic are reduced. Creation of pedestrian zones was just one part of a bundle of measures for city center development concepts.

Arabic cities are gradually realizing the risks of urban sprawl and have started planning measures to counter it (as it has been seen in the Amman case study), but in contrast to European cities, there has been up till now too little deliberate action to mobilize and regenerate the urban cores of Arabic cities, to restore their economic strength and specify their roles in the expanding agglomerations. There has been too little effort on the part of public authorities to unlock the economic potential from heritage management by linking it to development within a social paradigm. Any conservation projects of cultural heritage were concerned with certain monumental buildings and important touristic trails, but off main city axes the desolation is visible everywhere. Cultural heritage has been regarded by financial policy decision makers as a mere net consumer of budgetary resources, not as a possible contributor to economic growth that can reduce poverty and create employment [Cernea 2008]. And this despite the fact that historic *medinas* are the calling cards of Arabic cities with their unique regional and international, human, spiritual and architectural significance and that they continue to play a key role in hosting cultural, spiritual and religious legacies, and in sustaining traditional arts and crafts even in rapidly urbanizing and modernizing Arabic countries.

It is recommended that Arabic cities follow in the footsteps of European cities of the seventies where emphasis was more on improving the quality of the living environment and living conditions of the resident populations in historic cities and where rehabilitation of the centers has taken a holistic approach including whole neighborhoods (a similar approach was followed in Aleppo). Rehabilitation of cultural heritage and public spaces testifying to the common origins should play an immense role, especially during the recent wave of Arab awakening. These urban structures offer distinctive urban patterns and quality urban spaces incomparable to anything found in the other parts of the cities as contemporary Arabic cities have failed to reproduce comparable quality urban spaces and all too often have presented us with endless stretches of undifferentiated asphalted thoroughfares dominated by a sea of parked and moving cars.

Some *medinas,* like Fes, still offer half of all workplaces in their cities. The newly constructed or reconstructed CBDs at or near traditional downtowns (like in Beyrouth and Amman) have reinforced the central areas of these cities with a new concentration of jobs, and although these projects aimed at the rich, they have

"For better or worse, the most reliable measure of a city's vitality is whether rich people are willing to live in the center of it."
Jonathan Franzen

also created economic activities with a majority of workplaces in the service industry that will be filled by lower income earners coming from different parts of the city. They also have created retail that will be in competition with the retail in historic downtowns. So attempts to reinforce the traditional center and revitalize cultural heritage is seen as paramount, especially in times of "cultural globalization".

A published monograph assessing the rehabilitation projects in the *medinas* for the MENA region in the last ten years clearly points out the importance of improved public spaces for the success of these initiatives. For a rehabilitation project to be considered successful, three objectives should be met: it should contribute to the economic development, it should improve the living conditions of the residents and it should contribute to the conservation of urban and cultural heritage [Bigio& Licciardi 2010]. Now the rehabilitation of public spaces plays an intrinsic role in all of these objectives: if rehabilitated, public spaces will ensure that the street pattern and the parcels are preserved thus ensure the authenticity of the historic city. Public spaces have been traditionally the key locations for social interaction which mainly took place in the spaces of the streets and their *fina'*, not inside shops, as well as for cultural and entertainment activities, thus sought after by residents and tourists alike. If paired with leisure and cultural facilities, events and festivals, public spaces could be marketed for their urban quality and contribute also to economic development by transforming the *medinas* into attractive recreational locations, for both residents of the *medina*, families from other parts of the city and national and international tourists in the vein of European cities that have treated upgraded public spaces as the hardware for inner city development, whereas leisure and cultural events as its software.

Furthermore, in central areas where land is scarce, population densities are high and there is little common recreational space that has been designated for the people, safe streets and good quality public spaces should be what recompensates for the lack of common recreational space and playgrounds for children. This is of utmost importance for the optimal development of children in Arabic cities that have been recreated mainly indoors or in shopping malls.

Medinas and traditional downtowns should stand for history, leisure and culture and offer a family-friendly and cultural environment. But an attractive public realm in the *medina* will not be achieved if cars are not restricted from it. Investment and planning for car-free *medinas* (or preserving the existing car-free *medinas* like Fez) has the potential to reinforce cultural tourism. The great loss from not resurrecting historic Arabic centers is best expressed by Sami Serageldin, the head of the Architectural department at al-Shorouk Academy, who lamented the Cairo *medina* and pleaded for the resurrection of its glory in 2007: "... We are loosing our identity and history, leaving Cairo in this current situation is no less tragic than the theft of Iraqi heritage during the American attack in 2003. Both represent deliberate action

aimed at effacing Arab history" [Serageldin 2007].

As mentioned earlier, in order for Arabic cities to move towards sustainable mobility, a holistic approach with integrated measures both at the city and neighborhood/street level is necessary. Thus in the following, recommendations will be divided into two groups: city-level strategies and quarter-level strategies, the former will additionally specify recommendations relating to historic centers, whereas the latter will be divided into two groups: strategies for a typical historic neighborhood, and strategies for a typical modern suburban neighborhood.

5.3 RECOMMENDATIONS AT THE CITY LEVEL

5.3.1 Traffic Preventive Measures
These preventive measures aim at stopping further urban sprawl and outer migration of people and businesses from the inner center to the outskirts and improve the spatial structure of cities and awareness of people to reduce and avoid traffic generation.

- **Instigate a Paradigm Shift and Change in the Mobility Culture:**
This means two things: changing the way we travel and changing how we deal with mobility problems.
Effecting change in the mobility culture of Arabic cities requires a fundamental change in the community's attitudes towards the "individual car"and de-emphasizing its status: it no longer plays the main role and dominates the cities, nor enjoys preference. Instead, users navigate their way by choosing the most appropriate mode among multiple choices that are made available, depending on the specific section of a journey. This entails effecting change in people's long-acquired habits and mobility patterns by planning in collaboration with them rather than for them.
Effecting change in planning approaches, on the other hand, means moving away from the beaten path and conventional problem-solving that have mainly been car-based and thus the main reason for lower urban living quality. This necessitates doing away with the "predict and provide" approach that routinely expanded supply (especially of the road system) to meet anticipated demand of increasing traffic volumes, often at the expense of historic structures and the natural environment, and replacing it with a "traffic dissolving approach" that tackles car ownership per se, sets limits on motor vehicle growth, and which subjects vehicular traffic and adapts it to existing built-up structures in the belief that travel demand can be influenced by public policy, especially by means of travel demand management or "mobility management" [Vigar cited in May, Tranter & Warn 2010].

Experts in the field agree today that "conventional" problem-solving concepts like transport demand management measures and attempts to reconcile traffic with the urban environment will not alone be able to meet future challenges, as they sooner or

later reach their capacity limits. The necessity to tackle "car ownership per se" has been pointed out by them:

Reutter & Reutter (1996) point out: "*Modern concepts for coping with city traffic today are geared towards lessening the negative impacts of traffic congestion, relieving cities by calming and managing the traffic to make it more compatible with the environment, but they rarely question car ownership. With all the relief received from those measures, the rising motorization will doom all these efforts to fail in the long* run".

They further add:

"*Conventional problem-solving strategies like traffic-calming, cars' technical improvements etc bump against their efficiency limits… they do relieve the environment but they hardly keep up with the increasing motorization*"

Steering of Arabic cities where traffic management has not yet been extensive, towards adopting the more "innovative" strategies could spare lots of time and resources.

• **Disseminate Information and Spread Awareness:**
Communication and outreach should not be regarded as an ancillary function that will merely increase the chances of the planning's success; it is rather a critical, indispensable component of the scheme itself. It entails disseminating information and spreading awareness about the benefits of reduced speeds inside cities and the benefits of alternative transport modes (economic, ecologic etc) against the damage that the current urban mobility trends cause to the local environment, the aim being to shape the public opinion (of citizens and politicians alike) in favor of non-motorized modes to encourage behavioral change and achieve a shift to more environment-friendly modes. Experts even point out the need to use the same marketing strategies used for advertising the private car and to promote non-motorized modes as a lifestyle not as mere transportation modes. Also different marketing messages with different persuasion tactics should approach different societal groups, so in order to entice the well-to-do to come and live in the *medina*, the idea of car-free or car-reduced living should be sold as an attractive and progressive "lifestyle" amid high quality, safe, calm and children-friendly residential environment and, if adopted by them, they could contribute to the rescue of own cultural heritage. When addressing the middle and low-income households, many of which are car-less, stressing the economic benefits from not owning a car, should gain priority.

Equally important is to provide incentives in form of special tariffs for the youth or employees and to keep people informed about new infrastructure and transportation choices, as well as keep them updated about any changes in schemes, public transportation routes, schedules, alternatives, new tariffs and best offers; even if these changes are only temporary, people should have the right to be informed about them in good time. This should take place through appropriate school and TV education-

al programs, public transport marketing campaigns, provision of information in the printed press, on radio, TV as well as online, through a city transport-related website in the Arabic language This also includes maps (printed and digital ones) showing the routes of different transportation lines and mode networks.

- **Introduce Integrated Land Use & Transport Planning to Reduce Travel**

Determine whether to Use a Monocentric or Polycentric Strategy

For smaller Arabic cities, steering development towards centralization and a monocentric structure would be more sustainable in which planning efforts concentrate on the revitalization and strengthening of the city center. A different approach could lead to premature urban sprawl.

For major cities like Amman and Cairo, on the other hand, that have acquired a polycentric structure, that are suffering from urban sprawl, and where suburbs will probably continue to be important residential and business areas, reurbanization of the inner city should be accompanied by the strengthening of district and sub-centers. It must be decided whether one of the centers should dominate and develop into the "Main City Center" and "pivotal supply center"whose catchment area extends to the whole city, catering to a unique, attractive and experience-fostering retail center" and a good place to live in. In this case reinforcing the decaying inner cities that are often composed of dual CBDs (traditional & colonial) and have long been neglected by policy makers, should become a priority to make them immune to the competing retail centers on the periphery, whereas district and sub-centers are reinforced and rendered partly autonomous as well, to draw their users from a local or intermediate catchment area and serve as "cores" at a district level. Finally neighborhood centers will act as local supply centers for catering to daily needs and basic supplies and services that should be accessible within a walking distance.

An alternative would be to have multiple nodes among whom none dominates, but all preserve (or develop) their own character, functions, and economic activities and are self-sufficient.

New mixed-use and high-density nodes are preferably to be created by building upon existing communities and infrastructure and reinforcing already existing district centers or locations with increased concentration of jobs and public sector investments like city halls, libraries, theaters, public squares and parks to which new workplaces (office buildings) could be added. These must be served by transit and preferably be located at the junction of high-capacity transport corridors. Although many informal settlements are self-sufficient, such mixed-use centers can be established at strategic locations serving several such settlements to support and strengthen them with additional and missing amenities (educational facilities, health and recreational facilities etc)

and become hubs of transit and pedestrian movement.

Strengthen and Revitalize the Central City

Create a vision for the city center in order to regenerate the *medinas* and the 19th and early 20th century established neighborhoods that surround them. A necessary step is to reinforce the compact city core and to make best use of the opportunities it presents to support sustainable development and transport. This requires that the economic strength of the city center is restored and its role in the wider city is established. Experience has shown that without securing a strong supply function of retail and services in the city centers, even the well-rehabilitated, well-designed historic cores with all the necessary public amenities and a wide range of cultural offers, will not suffice, with the result that historic centers acquire a museum-like character [StMI 2001].

But due to to the *medinas*' specific urban structure, the question of the functional and physical linkages between the *medina* and the rest of the city especially the surrounding (adjacent) urban areas becomes crucial: the historic core should not be considered separately but the inner city as a whole should be integrated and considered at once and the new and old CBDs should complement each other: the former should become the "reception area" of most motorized traffic targeting the inner city (including the historic center), where parking facilities should be distributed concentrically, whereas the latter will act as the "breathing lung of the whole inner city". Although it is important for the *medina* to retain its economic importance, the two cities— old and new— should complement each other in their functions, but keep their distinct characters at the same time to achieve symbiosis rather than competition.

The "modern downtown" or "CBD" should cater for those functions that are hard to locate in the *medina* because of the involved demand for vehicular accessibility (like larger hospitals, governmental institutions, service enterprises etc) so that they are proximate enough to be well accessible for the *medina* residents by soft modes of transportation. The *medina,* on the other hand, should offer "a distinct car-free/car-reduced attractive urban environment" catering to more cultural establishments, healthy living, traditional crafts and landscaped public spaces.

In order for the city center to keep up with increasing competition from other shopping centers (that have sprung all over the city) shopping in it should be part of a greater experience, the so-called "city center adventure world "as described by Pesch (2002) where visitors, regardless of their social status, can spend quality time, shop or loiter, sit in cafes, visit museums and art galleries, where diverse uses are located, activities take place in the open air, city festivals and art events are organized etc), all this taking place in attractive, family-friendly and quality public spaces that link culture with leisure and local history and a place where people are aware of their common bonds.

But since high-class shopping in Arabic cities is mainly provided beyond the historic city (in district centers, peripheral shopping malls and even in newly built CBDs like in Amman) and since the bulk of households in Arabic historic centers belong to the lower-income populations, then the range of goods on offer in the historic centers should prioritize the needs of its actual users who are residents of the city centers (lower-income), national and international tourists by remaining faithful to traditional products, traditional foods, artisan goods and crafts, but it should be made more diversified, address the needs of mid and upper-class users as well like service establishments offering smart cafés, local upscale restaurants, tea houses, boutique hotels, and bookshops. Goods relevant to the historic centers should not be allowed to be sold in many other locations.

Integrate the Old Town into the Total Urban System

Physically, the car-free historic center should not become an island, isolated from its surroundings and be accessible by merely some footbridges, in Europe this has been already recognized in the seventies, when it was determined that close links and intensive connections with the surrounding areas in form of integrated pedestrian and cycle networks is a must for successful pedestrian-oriented city centers [Heybey 1977].

The analysis has shown that many of the historic center's users are people from the surrounding villages, thus safe pedestrian connections between central bus and *serveece* terminals with the historic center are of highest priority and pedestrian paths that well connect the parking structures located at the fringes with shops and public facilities. With regard to vehicular traffic, European planning experience has shown that a radial solution in the inner city with tangents or loops is more favorable than a real physical ring road (see figure 5-3), while the former allows for further development and future extension of the pedestrian-privileged areas of the historic city in various directions, the latter can act as a miniature of the "Chinese wall" and obstruct further development. The way towards the pedestrian city should be left open [Heybey 1977].

Fig. 5- 2 Aleppo *medina* is disconnected from its surrounding to the west (where the regional bus terminal is located) by means of a wide monofunctional street

Guide Employment and Business Distribution

Land-use planning can further reduce the impact of traffic on the urban environment if it guides the distribution of businesses on the municipal level. For this, the Dutch ABC system can be considered. The system is based on locating "the right businesses in the right location", as different businesses and types of employment have different transportation requirements, whereas urban areas can be either more resistant or more sensitive to vehicular traffic.

Accordingly, different zones are devised where jobs are encouraged to locate: "A" locations require good transit (people-based activity sites, such as offices, hospitals, educational facilities, shops and recreational facilities, "B" locations have a mix of accessibility requirements, whereas C location need good freight access, the city is then given different accessibility profiles depending on whether it is more like A, B or C.

It is recommended that the system serves as a guide rather than a statutory plan. Small production in historic Arabic cities depending on frequent goods distribution is unfortunately incompatible with the rest of the mixed-use centre, but its vital economic position makes it impossible to consider relocating it at present. But the system could be used for the city at large and for future companies.

It could also be used in an attempt to direct and transform the historic centers into fertile incubators for emerging small businesses in culture and knowledge-oriented industries in the far future that would require less traffic and a more pedestrian-oriented environment linked by good transit. This necessitates establishing a vision for the whole inner city.

A good example (positive scenario) has developed in Tunis city where locating some elite schools adjacent to the *medina* but above all the government district with close spatial connections to the *medina*, has led to investment and restoration of palaces and houses of the *medina* to accommodate state institutions as well as cultural and social facilities. Secondary effects of the specific location of the government district is the emergence of a wide variety of clerks' posts, copy shops and a large number of food establishments within the *medina* and at its edge where employees of the government district, neighboring authorities and tourists wine and dine, all this contributing to the revitalization of the *medina* [Escher & Schepers 2008].

Introduce Intensification and Densification:

As suburban developments in most Arabic cities have a relatively low population density and are very car-dependent, and since many these built-up areas have a large percentage of vacant land, like the case in Amman, intensification is recommended within suburban built-up areas as well as along some major city thoroughfares. This can increase the efficient use of existing infrastructure through zoning ordinances that increase development densities in existing neighborhoods and along exisitng corridors, promote mixed-use and pedestrian-friendly streetscapes,
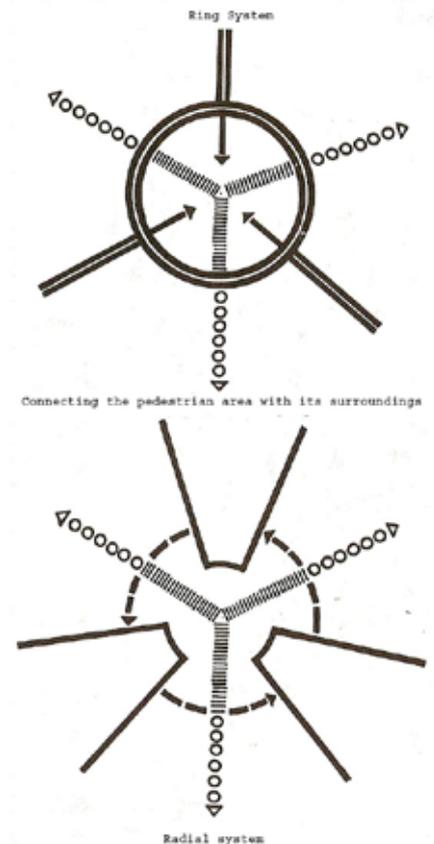
Fig. 5- 3 Outside accessibility to the pedestrian area—through a ring system (above) or a radial system (below)
(source: Heybey 1977, p. 46)

under the condition that intensification corridors are linked to high-quality transit. Therfore thoroughfares for intensification and densification should be chosen among those that already carry transit along them or are foreseen to do so, otherwise modal shift will not occur.

Filion [2000] argues that if the vast majority of people accessing the suburban mixed-use centers rely on the automobile, then it will be impossible to give up on the great amount of space devoted to vehicles and parking in these mixed-use centers. This in turn will hinder creating attractive pedestrian environments and translates into reliance on the car for intra-center journeys as well. Although researchers believe that reinforcing suburban development with the appropriate densities and mix of uses through infill and rezoning will automatically transform a suburb into a more compact and transit-oriented and pedestrian-oriented environment, Filion (2007) contends that this nodal approach (creation of a mixed-use center strategy) will not, alone, be able to markedly distinguish these suburban centers from the standard suburban developments on their own. Instead, he argues for combining the "nodes" strategy with "intensification corridors" as it is a better alternative to nodes on their own. Nodes (especially suburban mixed-use centers) to fulfill their objectives, namely to reduce sprawl and residents' reliance on the car and to counter more dispersed locations of jobs, must be well-served by transit services as explained above, but in order to justify these services, they should attract sufficient ridership and this can be ensured by running them along high-density corridors bordered by mid-rise residential buildings with retail on the ground floor. This is further justified by the fact that if there are numerous nodes they will most probably be similar in their make-up, therefore most movement will not be between one node and another, but between the surroundings (intermediate catchment area) and these nodes, so it is equally important to improve connections by fast and frequent transit links connecting the nodes with areas lying at intermediate distances from them. But as could be seen in case study Amman, for corridors to be feasible, they should be pedestrian oriented, and have a defined public realm and as they extend many kilometers, a sustained interest and consistent interventions are required over a long development period. Such requirement may be beyond the limits of the coordination capacity of the existing planning systems.

• **Steer Land Use in Historic Arabic Centers:**
As could be seen in chapter III, historic *medinas* have evolved from self-sufficient cities to become central urban cores of much larger agglomerations of which they represent a small portion. If the *medinas* are to be revitalized in a sustainable way, then employment of their economic potential related to their cultural assets should be linked to a social development paradigm, mainly to reduce poverty and create employment opportunities. This also means that *medinas* should accommodate a mix of uses serving and attracting the different groups of *medina* users (residents

of the *medina*, residents of the agglomeration at large, national and international tourists) that have different requirements (as mentioned earlier).

Apart from retail trade, there is also a considerable part of production in the city that requires more accessibility by delivery trucks and hence is not compatible with the mixed-use center that could thrive in a more pedestrian-oriented environment. The emerging new uses related to tourism also present a threat to the traditional structure if they remain uncontrolled.

Land use planning in historic centers should have the following tasks:

Reinforce the Traffic-Sparing Traditional City Structure

Due to the very compact structure of Arabic historic centers, most residents live within 1 to 1,5 kilometers from the center's core (the main souks and Friday mosque). In addition, as mentioned in chapter one, the quarters were equipped with their own services, making them to a great deal self-sufficient and independent from the central area for most pressing needs. This former structure of dense and self-sufficient residential quarters should be recreated as it lays a good foundation for the "City of short distances", where people are enabled to cover most of their pressing needs like foodstuffs in their quarter or the nearest surroundings, whereas for covering and obtaining complementary needs and services, they would proceed to the *medina*'s commercial core or the surrounding peripheral quarters of the "colonial city" catering to complementary uses. For this, they would walk or ride a bike, or even conveniently hop a few stops on a bus or tram as there are simply more activities accessible within a small radius [Newman & Kenworthy 1999].

Experience has shown that people living in the direct catchment area of a central area (including areas lying within 500m of the central area), as well as the indirect catchment area (which include residents living within a diameter of 1000m of the center), are willing to cover their daily needs on foot and by bicycle in the center which they also use for "staying and lingering" activities. What decides which areas of the central area are intensively used by these residents depends on their attractiveness and the infrastructural facilities (amenities) that they offer [Heybey 1977]. So the oftentimes missing elements for this concept to come about in planning practices for Arabic cities are good transit, quality bicycling and walking infrastructures in a traffic-calmed and traffic-free urban environment

Newman & Kenworthy (1999) express this well:

 "*Cities in the developing world with high-density, mixed land uses and a tradition of non-motorized mode use are mostly experiencing a diminishing role for walking and bicycling. Reasons for this are because non-motorized modes in these countries are seen to be backward, not a symbol for economic progress, whereas the car is symbol of success. Another reason is the extreme speed in which cars are increasing in these environments, which are ill-equipped to deal with them because there is*

no sufficient road space in the tight, compact, urban fabric that charac-
terizes cities in the developing world" [Newman & Kenworthy 1999]

"A compact, urban, ecological city and high motorization rates pose
incompatible individual demands. Within the densely developed older
districts at least, sustainable development is not possible without reduc-
ing parking areas and car ownership. A lifestyle without a car is already
a reality for a remarkable share of households in the inner suburbs of
large cities"
[Apel et al. cited in Scheurer 2007]

Cars consume land even when they are not in use, taking away
space from other uses, which makes moving by car in dense ur-
ban environements all the more unsustainable.
These inherent assets rooted in the historic structure of traditional
Arabic cities (density, diversity) need to be further exploited and
tailored to suit contemporary and future needs, to ensure that
people's daily destinations (*medina* residents) and zones of inter-
est are concentrated close to home and can be reached by soft
transportation modes, but especially on foot within five minutes.
This requires carrying out detailed socio-economic and land use
analyses and interviews of the users-occupiers, but also potential
candidates interested in living in the historic center, to determine
the amenities that are desired but are lacking in the old city (like
day-care cenetrs, kindergartens, hammams, community centers,
healthcare centers, barber shops, banks and shopping centers etc.
The past partial self-sufficiency of residential quarters should be
recreated and the supply of most pressing daily needs should be
provided by local shops in the neighborhood's *suwayqa.*

Socio-demographic characteristics need to be considered as well,
so the large percentage of youth and children, for instance, means
that their needs need to be prioritized and that good accessibil-
ity to educational and leisure facilities needs to be ensured and
wherever possible located in proximity to home. Such facilities
include day-care and health centers, cinemas, youth and sport
clubs, libraries, game halls etc. Also making sure that neighbor-
ing quarters of the "medieval and colonial cities" complement
each other in the supply of goods and services. If supported by
active municipal and political management, this could become a
tool to save on transport needs and generate a healthy and sus-
tainable model urban setting in a much simpler way than in any
other urban setting.

Enhance and Protect the Residential Function
Furthermore land-use planning in historic centers must help at-
tenuate the economic pressure on the old city, ensure that a har-
monious balance between the different functions in the *medina* is
maintained, give priority and reinforce the residential function
to avoid the destiny of many European centers transformed into
retail- or office monocultures.
The reality of today's *medinas* has shown absence of any action

that would protect the residential function from the increasing invasion of commercial and touristic establishments that have begun to displace local grocery shops by souvenir stores, and transform private houses into boutique hotels or guesthouses. Indeed no "zoning" regulations exist that would control or group certain uses together along designated axes, this has introduced more traffic into residential neighborhoods and began to alter the traditional spatial composition which distinguished between residential and commercial areas. The setting up of these establishments is seen at times as the only way to save these buildings from decay, but the reuse of old courtyard houses into boutique hotels off public streets like in the case of Jedaideh, means that we are interfering in its original structure, introducing strangers, namely tourists to the semi-public and semi-private streets that functioned as the extensions of the houses and therefore undermining the neighborhood's historic identity. Historically *medinas* were very receptive and open to foreigners, but these had their place in the commercial nucleus, in *khans* that functioned as hotels and were situated off souk streets.

Therefore, regulative interventions can restrict the setting of particular risky new uses, including restaurants, to only certain zones or certain axes (i.e. the houses bordering a *suwayqa)*. Otherwise controlling and servicing these new establishments, that have practically been spreading everywhere, by delivery cars will be very complicated. The hierarchy of the inner streets in the residential cells should stay intact; the gradual transition between the public and private realms should be protected.

Pay Attention to Places of Work & Commuting Flows

While businesses within the *medina* including stores and workshops in the residential areas have often been run by people from outside, the old city's residents usually have left the *medina* to work in other areas. This was also conditioned by the rigid rent-control system in many Arabic cities that hindered the mobility of housing. Now this trend has even been on the increase since many governmental and administrative institutions are being relocated from the historic center towards new governmental buildings outside the old city (as they were big generators of traffic) or escaping the traffic congestion of the inner city. More and more residents many of whom do not own a car; will depend on public transportation to reach their workplaces. Planning should therefore attempt to relieve the pressure of commuting patterns on *medina*'s traffic by enacting new laws, giving incentives to people to move closer to their jobs and improve the attractiveness of soft modes of transportation.

Recognize the Relationship Between Economic Activity & Movement

The old city center is not an island; it is often surrounded by various urban activities and different land uses that emerged with the establishment of city extensions and new central districts next to the old *medinas.* So the overlapping area of the biggest concentra-

tion of actual economic activities and land uses in and around the historic center need to be examined to realize where accessibility to the old city needs to be enhanced by creating stronger links to these commercial zones.

Disperse Pedestrian Magnets

When possible, a localized concentration of pedestrian magnets (shopping centers, parking facilities, mosques, schools, transit stations and terminals) should be avoided, they should be dispersed all over the inner center to achieve an even distribution of pedestrian flows. This will ensure that peripheral businesses (surrounding the main pedestrian historic core), especially the low-yield ones can surivive [Monheim 1977].

Also easy and direct pedestrian and cycle access from public transport stops and stations and ambient areas, to important destinations that generate a lot of traffic should be guaranteed. In the *medina* such attraction points include major religious and cultural edifices (the Friday mosque, cemeteries or nodes with important mosques and *madrasas*, that arouse local as well as international interest. The car-free environment in the *medina* will facilitate accessibility to these places as well as enable fast dissemination of pedestrian flows on special occasions like religious feasts. Electric Taxi stands should also be provided close to these points.

Access to Schools

In some *medinas* numerous schools are located (i.e. Damascus old city), some are renowned schools that are frequented by pupils coming from outside the *medina* usually by big worn-out buses or mini-buses that increase traffic congestion and air pollution, especially that they have even been allowed to drive through some covered souk streets.

As the *medina* will be turned into traffic-limited zone, bus-schools should be prohibited from driving inside the *medina* quarters, instead, pick up and drop off points should be established at the periphery, pupils will be encouraged to use soft modes of transportation like walking and biking to school if they live within or close to the *medina*, walking school buses (Pedi buses) should also be arranged, under the supervision of trained volunteers (parents or teachers) who will either walk children to their houses in the neighborhood or towards the periphery from where mini-buses can transport them home and vice versa. This should encourage children to walk, and will be part of their schooling exercises. Bike racks should be available at every school.

Schools should play a complementary role to the "environment-friendly" city by spreading awareness about the importance of healthy and safe environments within which children are reared, about the benefits of movement but also by educating future generations about environmental issues and the value of their cultural heritage, and in raising children's awareness through education

Access to Boutique Hotels

People should be able to leave their cars in parking facilities out-

side the *medina* and switch to special electric mini-buses (owned by the boutique hotel) that can drive them and their luggage to their boutique hotel. This service should be available only limited times a day.

5.3.2 Measures Encouraging Shift onto Soft Transportation Modes:

• Strong Promotion of Eco-Mobility: Walking, Cycling & Public Transit

These strategies aim at improving accessibility to places by increasing the availability of alternative modes that one can use to reach his destination. Some trips and traffic can be shifted to alternative modes that are cheaper, sometimes faster, near silent and eco-firendlier than the private car. The depletion of fossil fuels, escalating pollution, carbon emissions and their influence on climate change has seen cities strive towards promoting transit, walking and cycling as important steps towards greater sustainabiliy.

Especially walking and cycling are resource and environment-friendly, have modest demands on road space while being able to transport far more people than the private car (i.e. a typical bike path can transport five times as many people as a car lane); which makes them the optimal solution in the context of Arabic cities with compact urban spaces, narrow streets and high population densities which would allow a better use of the scarce road space for other people-friendly uses. Good spatial conditions for walking and operating public transport are there, but the infrastructure is lacking. The traffic needs of all societal strata must be considered, improving mobility of the low-income populations and the car-less households, reducing dependence on the automobile, the stablishment of a well-operating public transportation and sound cycle and pedestrian infrastructures is a prerequisite for improving Arabic cities and the move towards sustainability. Without these, all planning will prove futile.

<u>**Focus on Quality Transit Development**</u>

Development of transit has long lagged behind in Arabic cities and in most cases, where earlier tram lines existed, they were not retained, in some cities, railway lines have been preserved but were disused. Now Arabic cities are attempting to catch up.

The transportation system should be hierarchic and have two main levels of mobility: the macro and the micro levels. At the macro level, the inner city, the different "urban nodes" (including sub-centers, suburban mixed-use centers with pedestrian malls and highest concentration of jobs) as well as important transportation nodes like airports, regional bus terminals, train stations) should all be linked together by high capacity transit that will run along main city arteries. Several arteries of these should gain precedence when appointing corridors designated for intensification. The transit network will be designed to transport large numbers of people very fast, its stations will be inte-

grated with other transportation modes. Such a backbone is vital if a substantial shift in modal split is desired and should be supported by an increase in the comparative costs between the use of individual cars and alternative modes.

Many Arabic cities do not have enough resources to develop a high capacity LRT or metro network. Since buses also travel on urban roadways, infrastructure related investments can be substantially lower than the capital costs required for rail systems. As a result bus service can be implemented cost effectively on many routes. But in order for it to be reliable it should be unimpeded by traffic signals and congestion, nor delayed by fare collection. Therefore exclusive dedicated lanes that are physically separated from other modes are necessary to ensure high speed, something that can change people's preference to that mode especially in normally congested areas. Thus the Bus Rapid Transit (BRT) can operate much like a surface subway system and be the much needed backbone for a successful system in an Arabic city if managed on the model of Curitiba Rapid Transit in Brazil.

As the inner cities of many Arabic cities will still preserve semi-centrality and a high concentration of jobs and amenities, it is necessary that the high capacity public transit links the different high-density urban nodes with the inner city, preferably by radial streets that are complemented by orbital routes at the periphery and by a ring or tangents around the city center if the spatial structure of the city allows it. Especially the dense informal settlements, but also new towns and satellite cities that were established with the purpose of tempering growth pressures on the central city, need to be served or linked to interchanges with rapid transit and connect it with the core city.

The micromobility system, on the other hand, will be deliverd by conventional buses, micro-buses and *serveeces*. They would have fixed routes or function on demand, function as intra-district bus services but also connect different suburbs together if needed, especially in cities where many industrial locations and manufacturing facilities have relocated to or have been established at cheaper locations at the fringes, the radial transit links will not suffice, as a lot of commuting will take place from housing areas towards the outer fringes and from suburb to suburb, and since it is uneconomical to link such dispersed locations at the outskirts by regular public transport, and in order to avoid dependence of commuters (existing and potential) on their private cars, these missing connections should be covered by private mini-buses or shared taxis depending on the demand.

Public Transit Serving the Historic *Medina***:**
Traditional residential quarters surrounding the commercial center can be served by public transport only from their outer edges, as no mode should cross the historic streets (exception to this are the *medinas* in which ruptures already exist in form of wide streets carved into their fabric at later developmental periods, depending on their width, could be used to facilitate entry by transit lines like trams or electric mini-buses into the

historic center. Such streets could be made "signature streets"
have a variety of shopping and dining options, theatres, cine-
mas, galleries and shops with landscaping and water fountains.
It is necessary that public transport stops are equally accessible
from all residential quarters of the *medina*, so stops should be
distributed evenly and be attainable within a five-minute walk
from any house (on the model of Aleppo). The lines will run
mostly along the perimeter of the *medina*, in case some houses
are located deeper in the quarter (farther away from the periph-
ery) then other solutions should be found, either opening the
end of a cul-de-sac (if physically possible) in order to shorten
distances and also opening of new gates (in walled *medinas*) to
establish better connections with the periphery, or residents of
these quarters should be compensated by giving them discounts
for public transportation use or equipping them with bicycles
or eco-friendly segways (if the time of walking would exceed
ten minutes). Only in *medinas* in which new roads were cut into
their fabric can allow public transportation to enter the *medina*
by introducing electric bus or tramway lines that circulate along
the wider streets.

It is also encouraged to provide "special needs" buses that will
transport the disabled and the elderly in mini electric buses and
use the neighborhood loops. Furthermore, Setting up "mobility
service points" in neighborhoods is encouraged, their main task
would be to serve the people of the quarters, provide them with
mobility related services and information, organize transport
of big items, provide a moving service, register any new handi-
capped members to the shuttle service, in addittion to organiz-
ing awareness campaigns and schooling; like bike-ride lessons
for children, etc.

Establish Park & Ride, Bike & Ride Facilities

At the far end of public transit lines, park and ride stations
should be established to serve mainly commuters living in sub-
urbs without direct access to high-capacity transit or for those
coming from the urban hinetrland.

Raise the Image of Public Transport

Among the main factors influencing the choice of transportation
means are transportation rates, especially important for low-in-
come groups that tend to choose the "cheaper" means, whereas
quality of service (clean facilities, dependable equipment, se-
curity and comfort etc), system reliability and time costs play
an essential role for middle and higher income users, actually
high quality and reliable systems manage to even attract higher
income people [Flórez 1999]. An important role in encouraging
people to use public transportation in highly polarized societies
are well-organized image campaigns, and a "persuasive control"
of public transport users, which means influencing them to con-
form to accepted behavior norms for riding a bus or metro, by
conveying positive instructional messages, over loudspeakers
or by posting signs in addition to providing adequately trained

staff with good communication skills — all with the goal of instructing the public instead of policing them and having a direct and user-oriented policy, this has been attempted in Caracs and it worked [Flórez 1999].

<u>Improve Pedestrian Accessibility</u>
Pedestrian planning in Arabic cities should finally approach walking as a viable transportation mode per se, while at the same time pedestrian infrastructure should be a supporting scaffold for public transportation, thus inter- and intra- neighborhood pedestrian links need to be improved.

Apart from traffic-calming and pedestrianization that contribute effectively to a pedestrian-friendly environment, especially due to reduced speeds inside city quarters, and apart from narrowed road widths and smaller corner radii, a pedestrian network should have continuous, uninterrupted and unimpeded routes (or sidewalks) in order to irrigate the city without gaps, potholes or obstructions (e.g. trees planted in their middle, traffic signs, lampposts, parking meters etc) to ensure safe and comfortable walking. Ramps are to be preferred over stairs where the terrain rises. Sidewalks should be wide enough depending on the volume of pedestrians, but international research shows that a density of no more than 0.3 persons per square meter is found necessary for comfortable walking conditions [Petersen 2004].

In city centers where streets are narrow and there is necessity for access by both cars and pedestrians, the vertical differentiation between the roadway and sidewalks should be abandoned and the whole street width should be leveled off, only a slight differentiation in materials can be indicated and cars need to drive at walking speeds.

Minimum distances between safe pedestrian crossings on main streets need to be determined with enough crossings (with signals, curb bulges, raised or textured surfaces and adequate lighting), provision of refuge islands to ease pedestrian crossings especially on main streets to avoid jay-walking, traffic lights should be designed to accommodate pedestrians especially where their volumes are high (e.g. on wide streets surrounding the *medina*) so that they are not disadvantaged with respect to waiting times.

Walking must be further enhanced through good groundfloor design to achieve good visual contact between the street and the inside of buildings, successful streets invite people to relax, watch others or loiter (staying activities), thus pedestrian amenities should finally find their way to the streets, especially the provision of enough seating for people to relax (more on this in chapter VI).

<u>Introduce Bicycle Planning on a Step by Step Basis</u>
Although cycling in Arabic cities is not an inherited practice and topography in some cities certainly could act as an obstacle, many cities like Cairo, for instance, are largely flat and have mild

weather most of the year (except in Summer when it is very hot) and considering the low costs associated with using bicycles, cycling as a transportation mode has been largely neglected especially considering that the majority of the population in such cities is poor. Safety issues and unavailable infrastructures are the main reasons for the absent usage of bikes. Although socio-religious and cultural determinants could have an influence on women's cycling in Arabic cities (as it is more common to see men cycling in the more conservative *medinas* than to see women), examples from Europe show nonetheless that once proper infrastructure is in place even conservatively dressed women have been noticed to ride bicycles. Furthermore, the mode could have a future, as the percentage of the poor in arabic cities is high, this group is mainly dependent on non-motorized means. Similarly high is the percentage of youth in Arabic cities who are much more aware and open-minded to the idea of sustainability and a healthy lifestyle, thus will be more flexible towards changing their mobility patterns if appropriate infrastructure exists.

Experience from Europe has shown that the bike is the fastest transportation mode in an urban area for distances up to two kilometers. In Copenhagen (1,8M people), which is among the five friendliest biking cities in the world with 37% of its citizens commuting to work and education by bicycle, the mode has won the hearts of users because it has been faster, cheaper and more convenient to find a parking. In the words of Chuck Ayer, an American executive director of a bicycle club in Seattle, for this mode to become viable, a critical mass is needed [cited in Nelson 2009]. He believes that creating such a critical mass in countries with high dependence on the automobile, would require providing a bicycle environment that is safe, comfortable and enjoyable for everyone, including children, older adults and commuters. Ways to promote cycling are two: through physical design and through education and awareness campaigns.

At the city level, it is recommended to devise a hierarchical classification of three different cycle network categories for the whole municipal area like it has been done in Regensburg, Germany: a superior network that serves regional circulation and is an extensive mesh system independent from motorized individual traffic with comfortable paths and high environmental quality; another primary network with axes that run along main streets and arteries giving direct uninterrupted linkages between the most important origins and destinations (i.e. connecting main work and education centers with the most populated residential areas) on separate designated bikeways to provide maximum safety and the network should address commuter needs by providing direct routes. Lastly comes the secondary network inside traffic-calmed zones (like Tempo 30 zones or encounter zones) where cyclists coexist with the other street users on the same surface without having designated spaces.
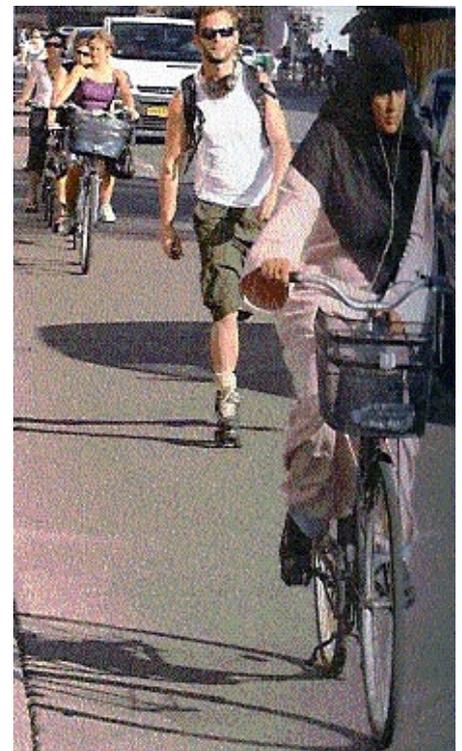
Fig. 5- 4 Once appropriate infrastructure is put in place, it can be expected that people from all cultural backgrounds will transfer to Sustainable modes
(source: Gehl 2010, p. 108)

In Arabic cities, where cycle infrastructure is completely absent, it is recommended to start with pilot projects, for example in the inner city by establishing good connections between the *medina* and its surroundings so that people living in car-free quarters in the *medina* can access services in the fringes easily. Similar to walking, bikes should be integrated with public transit, thus accessibility for cyclists to public transit stops should be ensured, and suitable, secure and sheltered bicycle parking at transit stops must be guaranteed.

Biking inside the historic *medina*
As regards the *medina* itself, biking inside car-free quarters and car-reduced quarters could be authorized, only at walking pace without disturbing pedestrians, biking being subordinate to walking, whereas pedestrians should not obstruct bicyclists unnecessarily. The streets would function as coexistence surfaces; in some streets (like the new wide streets that have been cult into the historic fabric as well as in case a *medina* is surrounded by a ring road, a track (only lightly marked) could show the bike path. Cycling in the main souk streets and along the main commercial axis on the other hand will be banned in view of the high pedestrian flows making it physically impossible to bike. An essential part of cycle planning is the provision of parking facilities which should be safe in terms of preventing theft and vandalism. Simple sheltered bicycle racks installed for instance in the inner courtyards of some *khans* could be used by merchants that work in the old city (one car parking space stations 12 bicycles), on-street parking could be provided in the space of the *fina'* in front of the shops, whereas in the residential neighborhoods people would be advised to store their private bikes within their courtyards.

A cycle ring around the historic city center is also to be envisaged, on one-way vehicular streets within the inner center, cycle tracks running in the opposite direction to driving is a very common solution, now even cycling in both directions along such streets has become popular. At the fringe of the historic center where some parking spaces for residents of the car-reduced quarters are to be foreseen, "mobility points" can be created that integrate a car-sharing station (i.e. four electric cars) with parking racks for bikes and bike-hire racks altogether. This allows customers a big freedom in choosing the right transportation mode. Such "mobility points" should be integrated at transit stations, bike & ride facilities as well as at employee intensive workplaces and entertainment and shopping hubs. In addition to bike racks, bike-hire service aimed at commuters should also be provided, paid or free of charge so that they get off a bus, tram or train and ride to their workplaces depositing their bike at a rack next to their office. In other cities, bici-cards aimed at tourists that allow hiring a bike for one, two or three days and at the same time receiving free entry to municipal museums or reductions for certain leisure services (like some hotels and restaurants) can be considered,

but it is advisable to differentiate between hire bikes aimed at commuters and those for tourists, to insure that commuters find available bikes.

Biking in New City Districts
In existing suburban districts like Sweifieh, cycling can have a future for making short intra-neighborhood trips to neighborhood shops but mostly for inter-neighborhood travel between residential neighborhoods and the district commercial center trips. Here traffic calmed neighborhoods (30 Tempo zones and encounter zones) should have bikes integrated in them without the need to devise special surfaces since at low speeds (up to 30km/h) cycle traffic can be conducted along with motorized traffic on the roadway, whereas designated bike tracks should be created along main arteries and collector streets preferably on the expense of narrowing the roadways.

<u>Introduce Multimodality and Intermodality</u>
Like in La Rochelle (refer to page 86), with the right integration of traffic modes it should be attempted to achieve an environmentally-compatible city traffic:
The present low levels in car-ownership of households in Arabic cities especially in the historic city centers like the *medinas* of Aleppo and Tangier (Agence Urbaine de Tanger) and the informal settlements, present a valuable opportunity for car-free planning and sustaining low car-ownership levels. This can only be achieved if residents' mobility is increased while car-ownership in those quarters is kept constant. Appropriate planning measures should improve the mobility of residents; offer them a wide variety of choices to determine where to go and how to get there, rendering them highly mobile despite not owning a car. This would be feasible only if a full range of travel choices was established and a flexible system that allows easy transfer from one mode to the other is ensured. A system that guarantees flexibility and freedom of movement comparable to the freedom promised by the car, but at reduced costs, if introduced in good time, has the potential to maintain the current low car ownership levels also in the future.
A new management system should be developed with policies and measures that would render ownership of a car in those neighborhoods unnecessary, people without cars will not feel disadvantaged by such a system; on the contrary, people will start enjoying the advantages including the financial ones of not possessing a car. Moreover this system is meant to encourage even car owners to give up their cars for short distances. The improved environmental quality of the old city resulting from car-free planning should be an impetus for non-residents to consider moving into the *medina* or investing in it. High quality public spaces and safe urban environment with good social surveillance (inside the *medinas*) are in high demand by the affluent. Although the provision of parking spaces, as an incentive to attract higher income people to reside in the old city must be con-

sidered, this should take place within strictly fixed boundaries. An important aspect for the car-free strategy to work is the high quality of "alternative" mobility services like the basic needs for high quality pedestrian and cycle systems and a high-performance, high-frequency public transport system with a dense network of stops. These should be supported by a system of car-sharing stations, bike-sharing stations and an attractive tariff system for employees, students and residents of car-free housing, that will allow them to easily transfer from one mode to the next [Topp 2006 ; Monheim 2008]. It will also encourage commuters to use public transportation, and then ride a bike, walk to reach his/her destination.

5.3.3 Measures that Make Traffic Compatible with Urban Living

• Rethink the Functional Hierarchy of Streets
Arabic cities have adopted the conventional road hierarchy with a spectrum of major roads to minor streets, that basically produced two kinds of roads: distributors, designed for movement, and access roads to serve the buildings, the latter to be normally found at the lower end of the spectrum.

This simplistic hierarchy as explained in chapter II does no longer serve well in today's urban areas, as it discloses many street types that are essential, especially in times when sustainable urban development is calling for compact city models and transit-oriented developments, densification and intensification. This requires streets that perform a multitude of functions with complex public realms bringing different users to coexist peacefully together, so a street may carry high volumes of traffic and high speeds while serve high-density apartment buildings all at the same time. Here it is suggested to adopt a different approach to network design by creating or rethinking the hierarchy of urban streets, also within the boundaries of the historic city center: classifying routes or streets independently in terms of speed, transit-orientation, arteriality as well as urban space status (according to the multiple functions like connecting, access, service, lingering and enjoying etc).

This latest practice in European city planning suggests that it is more feasible to have a street that combines both a strategic public transport role and a significant urban place role. The conjunction of high-status arterial connection and high urban place doesn't necessarily represent a problem area, on the contrary, it could represent a solution area. Accordingly a particular street will tend to have a constant arterial status while having a varied urban space value along its length [Marshall 2005]. It is recommended that the different stretches of the main city arteries passing by different land uses to have their special designs (especially the pedestrian realm design) adapted to the land-uses that frame the street.

PLACE STATUS

Bab Antakia Street

Khandaq Street

High ◀ Low

LINK STATUS

High

1-A	1-B	1-C
2-A	2-B	2-C
3-A	3-B	3-C

Low

Amam al-Jami' Street (in front of Umayyad mosque)

Sabe' Bahrat-Great Mosque axis
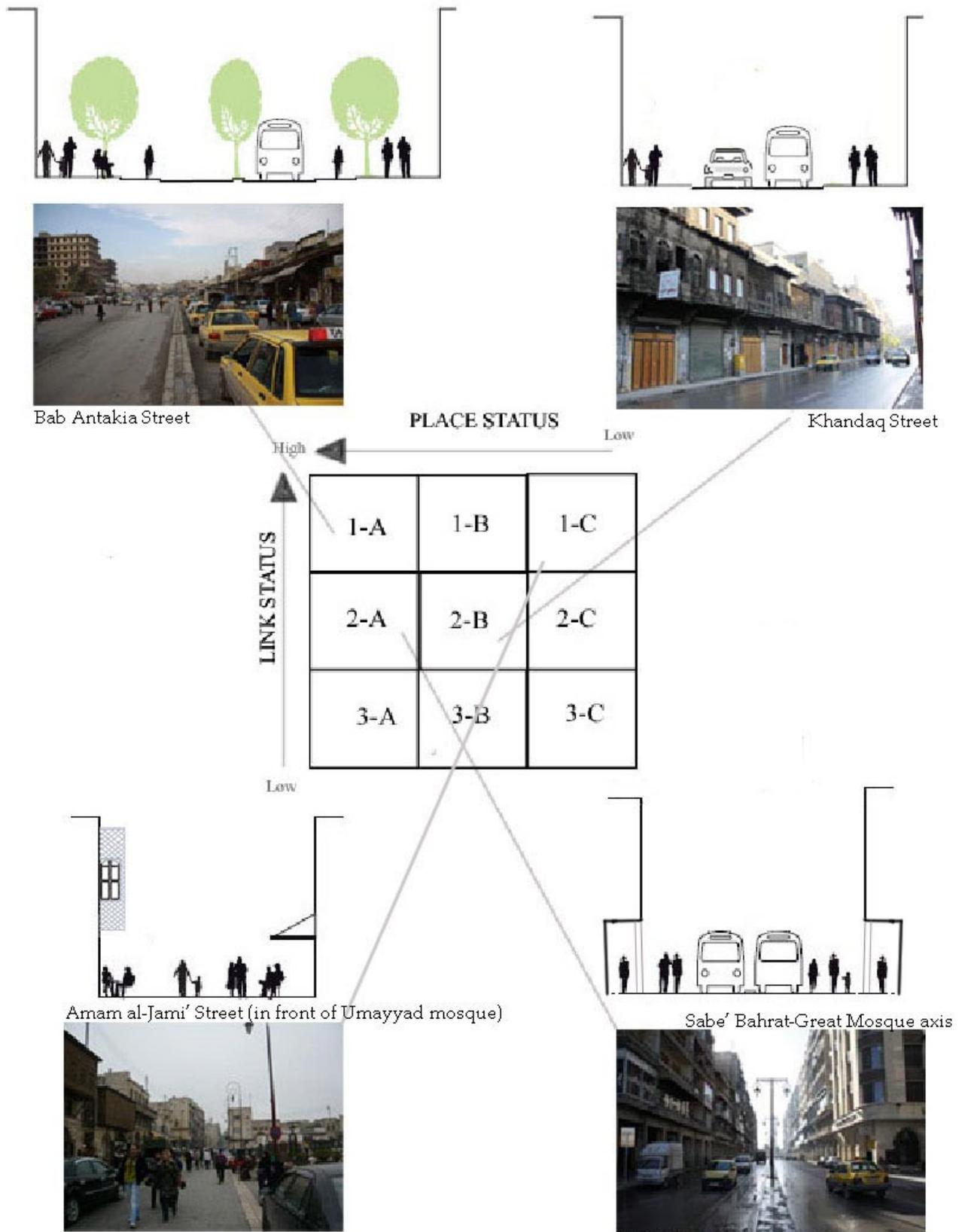
Fig. 5- 5 Achieveing a diversity of street types through redesign depending on their location in the netowork and the dominant function they are supposed to perform: "linking" or "lingering"
(source: own schematic collage with modified Jan Gehl's street typologies and according to Stephen Marshall's street classification)

With reference to traditional Arabic cities, and as shown in chapter I, the morphology of traditional urban structures reveals a high degree of spatial hierarchy with filtered permeability. This structure has been disturbed when wide streets had been cut through the urban fabric, and hence, there were now new streets that had no specification other than traffic distributors (later classified as main access roads) designated for the fast movement of cars cutting through the old city from one end to the other and beyond, therefore the lack of appropriate classification and design of all the newly-cut streets left them as mono-functional roads regardless of their sensitive position that they occupy within the historic urban fabric. It is suggested that the preservation of traditional structural features should be high on the sustainability agenda of historic Arabic cities; therefore it should be attempted to incorporate or adapt these new streets in view of the existing network and the existing hierarchies of the traditional settlement, this might promote diversity of street types and legibility of the layouts as a whole.

• Introduce City-Wide Traffic Calming

Traffic calming is still a foreign word in the planning agendas of Arabic cities. Speed limits in urban areas including residential neighborhoods are too high and vary between 40-60km/h, most accidents occur at these speeds and the pedestrian age group that is mostly affected by vehicular accidents is (0-18). Traffic calming has been mainly restricted to residential areas and streets with schools and translated to installing road humps and limiting speeds to 30 km/h only on short stretches of the streets.

Introducing Traffic-Calming as a System

It is recommended to implement traffic-calming city-wide, and as a system. This is important for the legibility of the roadway system to make sure road users understand the system which will guarantee that they will abide by its rules (speed limits). The entire city area should be consistently divided into a major road network and of traffic-calmed zones city-wide. The major road network will consist of main streets and important collectors, and have a speed limit of 50km/h, whereas vehicular speeds in traffic-calmed residential and commercial quarters (consisting mainly of minor collectors and access streets) will be 30km/h and 20km/h. In the case of financial shortages devising traffic-calmed zones can take place in stages according to urgency, so for instance priority could be given to dense residential areas or areas with schools.

The quarter-level traffic-calming concepts that are most appropriate for the context of Arabic cities will be discussed in section

Introduce Traffic-Calming & Car-free Planning in Historic City Centers: ban traffic from the historic center, devise a traffic concept to service the *Medinas*

With the exception of goods supply managed by time-zoning and
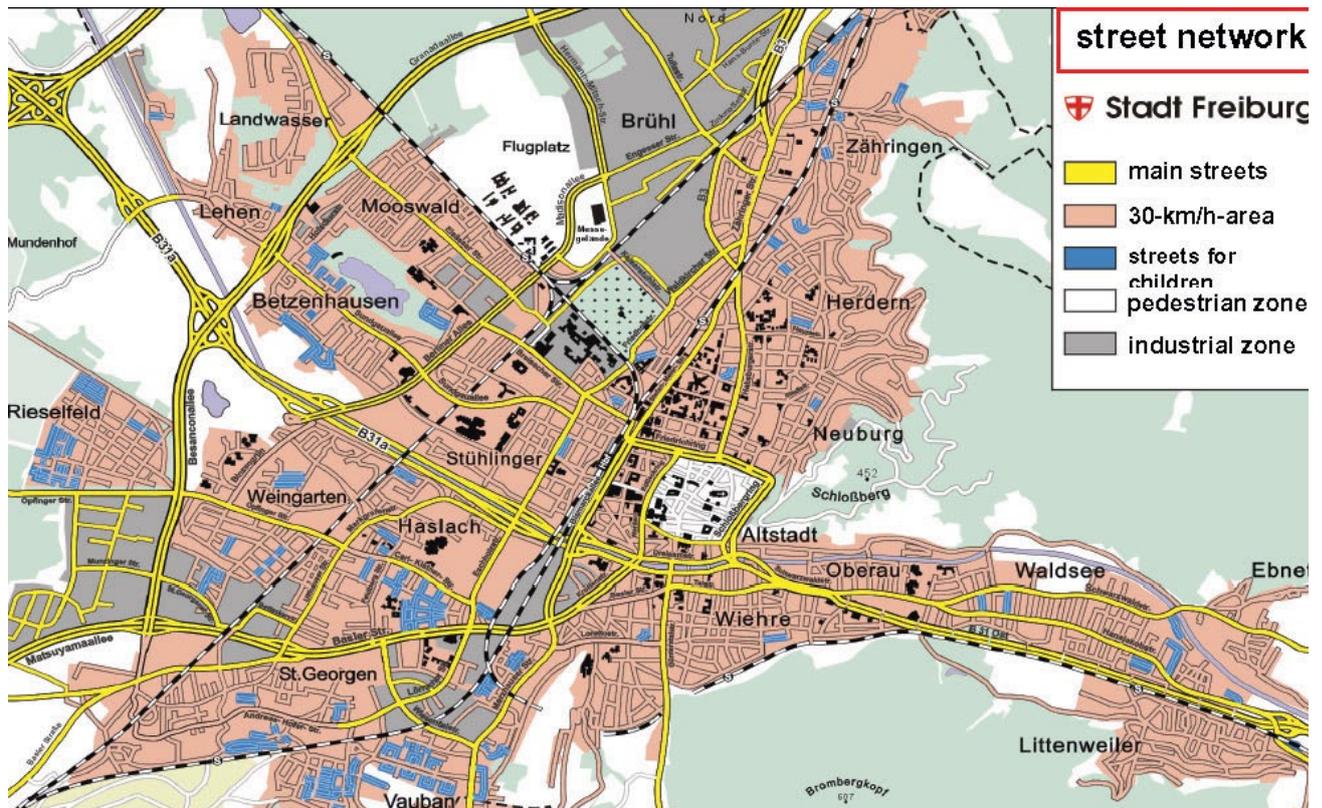
devising a network for emergency vehicles, the *medina* should be extensively freed from motorized traffic. Even residential areas will be turned into car-free and car-reduced neighborhoods (see section 5.4.1). This step will largely contribute to improving the urban environment that will be accompanied by the rehabilitation of public spaces which will help in redefining the role of the historic city in relation to the rest of the city and support the presence of increased pedestrian flows.

Devise an emergency vehicular service network by designating some streets as emergency and service access streets to enable the passage of small-sized emergency vehicles, fire trucks, ambulances, solid waste collectors and small pickups distributing gas tanks to people's houses (in the Middle East gas operated ovens are still in use, people need these gas tanks delivered frequently) after studying the whole traditional road system to determine the best network that will reduce the distances between the strategic parts of the *medina* with least possible changes. Inaccessible residential streets and dead end alleys that are too narrow even for the medium-sized vehicles should be within 100 meter of the emergency network, improvement of accessibility should not compromise the integrity of the historic fabric. Attempts should be made so that demolition is reduced to the minimum. A good example of this is Fez *medina* where such a network has been established and special-sized vehicles were chosen for this purpose (1,70m wide), thus modifications to buildings impeding the passage of these vehicles along the emergency network were limited to minor adjustments of corners of buildings (that were chamfered) and entryways (steps jutting into the street were

eliminated) [The World Bank1999].

• **Redevelop the main streets & Re-knit the Isolated Urban Units**

Many neighborhoods in Arabic cities are separated by highways, this forces people to rely on the car even for short trips (e.g. when moving to a district center from surrounding neighborhoods). Arterial streets also cross city centers causing disruption and social segregation **in** many formerly homogenous neighborhoods. In historic *medinas*, isolated units and a non-coherent urban structure have formed. This incoherence is best experienced when walking throughout some *medinas* that were subject to such radical interventions. Parts of residential units with their inner *suwaiqat* (smaller souks) act as islands or "pedestrian havens" surrounded by mono-functional barriers in the form of unsafe and congested wide streets. The pedestrian moving through such a neighborhood becomes confused when reaching the edge of the human-scaled area, and is faced with a dangerous chaotic street and is no doubt filled with a feeling of insecurity. An example of this is the Farafra quarter in Aleppo, see figures 5- 7 and 5- 8.

Equally disruptive are the ring roads surrounding some *medinas* that carry some of the remained through traffic across city centers, as well as arterial streets and highways surrounding or crossing modern neighborhoods like in the case of Sweifieh. These ring roads act as barriers for pedestrians moving between the *medina* and surrounding areas where usually car parks and important transport terminals are located.

Wide arterial streets surrounding modern suburban commercial centers, on the other hand, box neighborhoods and hinder them from acting as focal centers for the ambient areas, in large part residential neighborhoods, as they discourage inter-neighborhood movement and reduce their accessibility by potential non-motorized users (residents).

In order to lessen their impact, it is necessary to establish connection between the isolated units inside the old city on the one hand and between the old city and its surroundings on the other hand, these streets should be transformed by use of innovative physical solutions into environmentally adapted thoroughfares (sustainable streets, healthy and safe spaces equally enjoyed by pedestrians, bikers, motorists and buses (potentially also trams), with various streetscapes, outdoor cafes, an enhanced public realm with landscaped areas that integrate street vendors. Designate a signature street that should become the main boulevard spine of the city. This signature street should be further provided with modern amenities, cultural facilities, cinemas and shops offering a variety of merchandise that could satisfy the tastes of the middle-class.

As seen from the example of Sweifieh Commercial Center, such arterials should be redesigned into multi-way boulevards with beautifully landscaped streetscapes, carrying both slow local and

Fig. 5- 7 North-south street that was opened in the old fabric to improve vehicular accessibility to the Great Mosque of Aleppo

Fig. 5- 8 Another "scar" that is in need of knitting in the center of Aleppo, namely Abdel Mun'im Riad Street

service traffic and fast, high-volume and through-moving traffic. Boulevards can achieve two goals at once; provide high access and high movement at the same time. Often they are provided with medians which in addition to facilitating safe crossing of pedestrians, can perform as a linear park with popular gathering spaces, integrate bike and pedestrian lanes or transit traffic. Bike lanes can also be integrated within the slower side streets.

Dunham-Jones and Williamson (2009) explain: "*The multi-way boulevard is unique because its parallel roadways serve distinctly different traffic functions...It addresses the functional problems posed by the coexistence of through-movement and access to abutting land uses on major urban streets, in addition to accommodating the two speeds of vehicular traffic, they also accommodate pedestrians, bicyclists and buses graciously*"

Fig. 5- 9 Arterial street bordering al-Sweifieh seen from a pedestrian bridge

Successful examples of different multi-way boulevards include the inner ring road in Vienna, Octavia Boulevard in San Francisco. In Amman, and other Arabic cities arterial streets often have residential uses on them, so rezoning will not be necessary as it is the case in the U.S., both retail and residential uses are present and both have growing demand.

• **Introduce Parking Management & Parking Pricing**

Parking supply is an important determinant affecting choice of transportation modes, car drivers will always be tempted to use their cars if they knew a parking space is available at their destination and is free of charge.

If the city center is to be reinforced and revitalized, then relieving it from car traffic is a basic condition and one of the most effective ways to achieve this is by parking management. It is recommended to create a wide "concentric reception area" for vehicular parking around the historic center and inner city and downsize its amount, especially on-street parking.

Parking supply in city centers is required by different users: residents, visitors, business people and commuters. Parking possibilities in the most central areas should no longer serve long-term parkers; especially commuters (like employees and apprentices) who should be dissuaded from coming to their workplaces and educational establishments by car by introducing parking pricing in central areas and district centers, as they occupy valuable and scarce space especially in the city center, which is needed more for the business life and economic viability of city centers as well as for residents of car-free and car-reduced *medina* quarters. They should be encouraged to use public transportation instead.

This requires creating a wide crown or "reception area" around the historic center and the inner city in which parking structures would be distributed more or less evenly and capture cars on a concentric and zonal basis (first periphery, second periphery etc) – the more central the zone and nearer to the historic center,

the more expensive parking in it would be and the less time a car is allowed to station if the parking is on-street (on the model of Bologna). Larger parking garages or parking decks should be preferably integrated on the main access roads into the city center to "catch" motorized traffic early enough, however they also require a consistent integration into the city's existing building structure as mentioned in chapter II. These parking structures will finally free streets and public spaces from stationed cars, and create the opportunity to upgrade these spaces for other social and urban uses.

Medinas preserved in their whole entirety that didn't have wide streets cut into their fabric should not have public parking within their boundaries, whereas cities that underwent radical interventions like Aleppo, it is possible to introduce multi-level parking above or underground in a street that is strategically located and farthest from the most sensitive areas.

In the historic city, parking management should also be seen as a supporting measure for car-free and car-reduced quarters, accordingly parking facilities and spaces located at the first periphery of the historic center will mainly prioritize limited but free parking spaces for resident cars of the car-free quarters and their visitors or and for car-sharing stations. Some businesses in the historic centers could also have designated parking spaces in some of those collective parking structures so they are used for short-term by their customers. Visitors and tourists will also be allowed to park but should be ready to pay highest fees. The city tourist maps should be updated to include those locations for easy orientation, putting signs and a car-park routing systems that easily direct the drivers (visitors) to available parking and their facilities.

This is also expected to discourage shoppers intending to stay long hours from coming by car, as it becomes more costly to leave
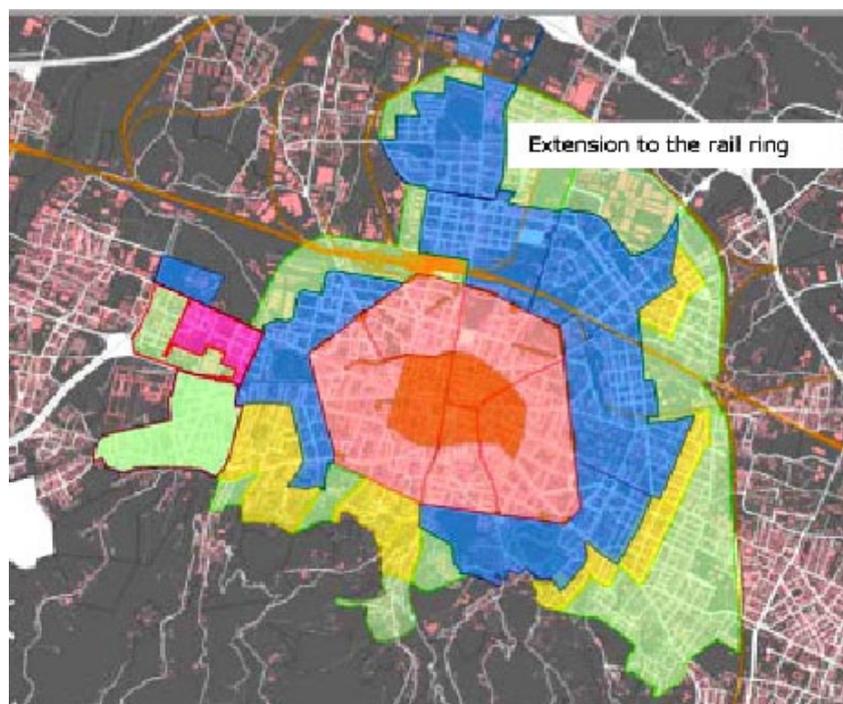
Fig. 5- 10 Parking management (zones) around Bologna
(source: Municipality of Bologna)

a car just outside the old city and continue on foot for the last part of the trip.

To serve commuters, especially those living in the peri-urban areas and suburbs that are not connected to transit lines, additional parking capacities should be provided by establishing park & ride stations at rapid transit terminals (where two high capacity transit modes, BRT or LRT, or lines meet) or at transit stations where passengers can transfer from/to feeder-trunk lines), from where they can transfer onto transit transportation modes and head to their workplaces (located either at the city core or at one of the district centers). Shopping traffic (intending to stay long hours) should also be discouraged..

• **Manage Freight Distribution: on the City Level**

Historic Arabic *medinas* have undergone a redefinition of their roles; they have either become the commercial centers of the whole region or are developing into important touristic destinations. Accordingly improving accessibility is needed to ensure the viability of the supporting economic systems like workshops, manufacturing facilities but also tourist facilities like upscale restaurants, bistros and cafés. Although some of these activities are corrosive to the urban fabric, it has been realized that the survival of the indigenous residents of these quarters is largely dependent on the maintenance of these commercial activities. Freight distribution is an important component that contributes greatly to the old center's traffic congestion and environmental pollution, therefore reorganization of urban logistics should attempt to minimize the disturbance caused by delivery vehicles as a whole (congestion, noise, pollution, damage to historic buildings, streets and sidewalks) as well as avoid over-occupation of public spaces especially in historic cities with narrow streets, by idling or moving vehicles.

Therefore attempts should be made so as to limit delivering goods inside the *medina* to certain times during the day and replace the delivery cars that have until now been used with environmentally friendly types, preferably by electric vehicles, at the same time ban heavy trucks from entering the old downtown.

Regional and intercity freight traffic should be limited to main streets upon approaching the inner city where specialized terminals shall be located at the its periphery on the model of La Rochelle city in France. From there, goods will be conveniently transferred from heavy good vehicles and large vans to more environment-friendly modes that will distribute them inside the old city center. The establishment of distribution centers will also facilitate goods consolidation and dispatching.

In the French city of La Rochelle (135,000 inhabitants) the Citroën Berlingo electric vehicle was chosen for this purpose, their design makes them well suited to the narrow medieval streets in the city center. A number of recharging terminals are strategically located throughout the city [Vermie 2002].

Fig. 5- 11 Special-sized electric vehicles distribute goods in La Rochelle
(source: Vermie 2002)

It is advisable to establish yet other "stopover" storage facilities at the immediate periphery of the *medina*, to which merchandise (i.e serving residential quarters) can be transported and left during times independent from the inner-*medina* delivery, these points will serve as intermediate stops for further transport. Furthermore trucks and freight vehicles should be equipped with navigation systems, the software cards should be updated in coordination with the providers so that they include the heavy-traffic street system in them like it is done in Europe, so it is easier for truck drivers' orientation to avoid sensitive areas when approaching the city.

Delivery to the traditional central souks should have own designated network by devising a one-way system for temporally limited car-accessibility vehicles running along the main streets converging at the center (or along the main commercial axis). These streets will generally be pedestrian, only during limited hours a day they will function as "coexistence streets". For example they could be used for delivery between 05-10 and 23-01 a.m. Counter to what has been assumed in the study done by Planco Consulting which stated that there is no need for parking for delivery cars inside the *medina*, the field study conducted in Aleppo including interviews with merchants and regulars and also based on another study conducted in Damascus old city [al-Rez 2010], have revealed that much of the traffic congestion is caused by searching traffic in form of delivery minivans that are in need of a "waiting space" in between deliveries ending up randomly parked along city streets, therefore it is recommended to:
- Set up "delivery-car sharing", where neighboring retailers or businesses make a cooperative delivery arrangement (deal with the same provider that offers his services on a time-based sharing) and use the same parking and loading areas. This could reduce half-empty truck movements and thus lessen the number of vehicles entering the old city while providing service to the same number of businesses. Grouping similar enter prises and productive activities together to facilitate deliveries

- Designating the yards of some run-down traditional warehouses (*khans*) for a supervised electric delivery vans parking, these cars that station inside the *medina* will be responsible for inner-city deliveries (between the fringe of the *medina* where intermediate storage facilities are located and different *medina* districts).

Introducing traffic-calming be it in residential quarters or mixed-use commercial quarters of Arabic cities is of acute importance, especially that there are no designated places for child's play, therefore neighborhood streets need to be safe to protect children and give them a sound environment to develop, whereas mixed-use centers need to offer shoppers a safe, attractive and care-free environment so they are able to compete with "big box" malls on greenfield sites. In the following appropriate traffic

calming for traditional quarters of the historic city center will be discussed, followed by recommendations for modern suburban neighborhoods:

5.4.1 Recommendations for Traditional Quarters

Due to the narrow cross-sections of the traditional streets and the concept of the *fina'* in the Muslim urban tradition, which contributes to additional constriction of the streets with multifaceted uses, and since the streets' widths are not constant along their lengths, car usage is simply incompatible with the urban structure of traditional Arabic cities and damaging to the *medinas'* environmental quality and cultural heritage. Even along the wider main commercial streets (where widths fluctuate between 3.2 and 5.4 m, in other *medinas* sometimes to 7m) cars could cause bottlenecks. With such widths, and the high pedestrian densities along most commercial streets, it is almost impossible to find a compromise to integrate mixed traffic, nor is there much margin left for the redesign and the resolution of the streets' cross sections, once the car is there, it will dominate the space. In view of this, driving would offer no time advantage over walking. In such areas, even one car every now and then would be distracting to pedestrians and would undermine their dignity and quality of city life. Furthermore the narrow geometry doesn't allow wind to sufficiently disperse emissions which makes use of motorized vehicles in the historic center even more harmful, not to mention the huge loss connected with the inability to appreciate the diversified spaces and to experience the powerful streetscapes' stimuli if one was to merely marvel at them from behind a windscreen.

In view of this and the loss of urban quality associated with car-use inside the quarters, the "innovative" or "radical" approach is opted for here: converting existing *medina* quarters to car-free/car-reduced quarters (or reinforcing the already existing car-free neighborhoods).

5.4. RECOMMENDED IMPROVEMENTS AT THE QUARTER & STREET LEVELS

5.4.1.1 Recommendations for Traditional Residential Quarters Intra-muros like Jalloum

• Transform Residential Quarters into Car-free Areas, provide a service loop

The traditional street system inside has a clear pedestrian hierarchic structure that ends with cul-de-sacs, this system has been based on pedestrian movement. As mentioned above, the spatial narrowness of local residential streets makes them impassable by normal cars as they have quite narrow cross-sections (ranging from 0.9 to 3.3m) which does not allow easy access to the plots, nor parking in front of the house, not to mention any turnaround manoevers, only some collectors are still permeable and are used by cars to approach the houses.

This entails that urban residential quarters should be kept car-

free most of the time, but it is necessary to ensure that every quarter or two adjacent quarters, can be accessed individually by service and supply traffic (for the transport of merchandise and raw materials to the storage facilities located inside the quarters or to serve shops along neighborhood commercial streets), and by some resident vehicles for pick up/drop-off especially of elderly people or the transport of heavy items. For this purpose one-way loops will be devised, mainly from first and second order of streets, starting outside the quarter (from the outer edge of the *medina*) with exits also at the *medina*'s periphery, those loops could be usable at certain hours per day or on limited weekdays (information signs informing pedestrians of the exact times vehicular traffic is allowed in are necessary).

Understandably, motorized traffic along the "service loop" will be calmed and subordinated to pedestrian and cycle traffic (cycle traffic subordinated to pedestrian) but pedestrians and cyclists do not unnecessarily obstruct moving cars, driving speeds in the quarters will be at walking-pace 20km/h or even 15km/h, so these streets that are normally pedestrian become "coexistence" streets during this time.

Arranging traffic in loops will hinder the generation of through-traffic, and will render crossing of the *medina* physically impossible. Retractable bollards will be installed to deter any non-local (illegal) cars; these could be controlled with a remote control.

As studies underline the fact that availability of car parking is the only way to entice the higher income earners, limited parking for residents and their visitors will be made available at the outer fringe of the quarter (see figure 5- 12), policies have to be strict about the number of parking spaces per quarter at the pe-
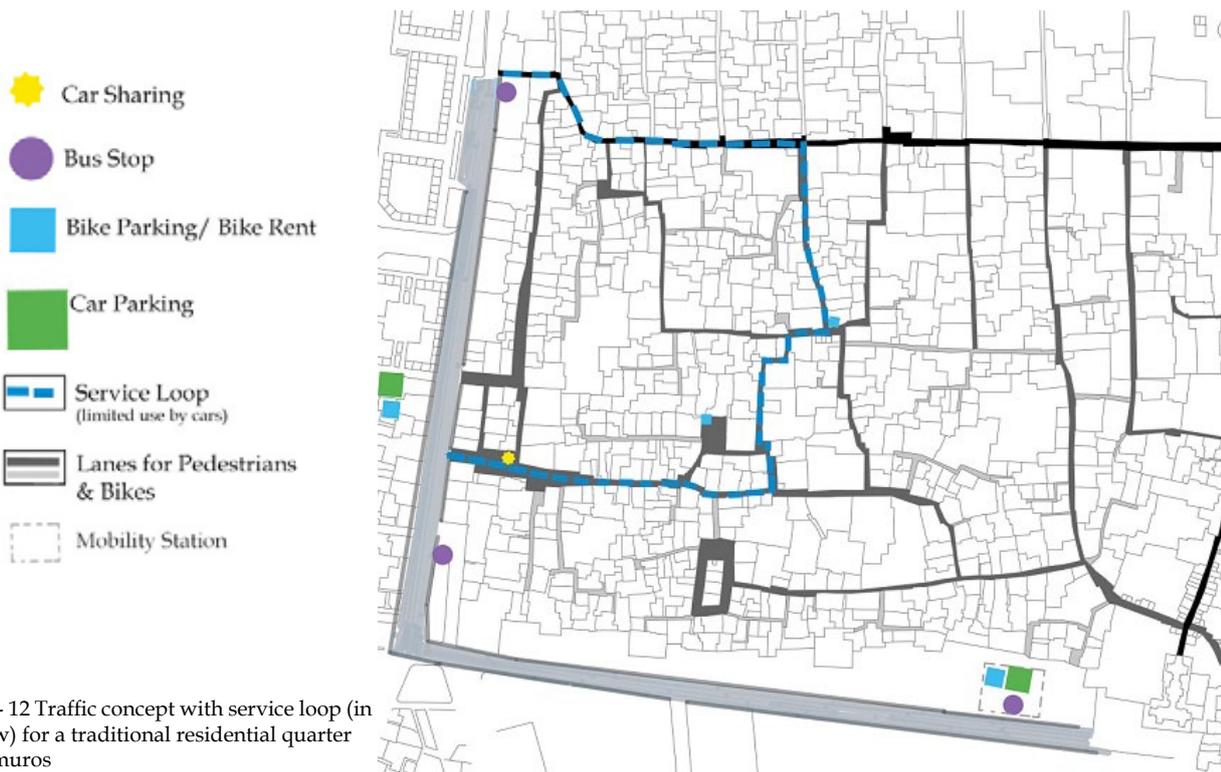

Fig. 5- 12 Traffic concept with service loop (in yellow) for a traditional residential quarter intramuros

ripheral garages. A margin of acceptable future increases in car-ownership should be established early on. The idea is to encourage higher-income people back to the city, but to draw a line that cannot be crossed by clearly prescribed regulations to control car ownership and gentrification.

Propagators of the "city of short distances" see the peripheral location of parking spaces as an essential step towards the realization of the concept; this corresponds to the postulations of the Viennese transport expert Knoflacher, who believes that car drivers should walk to their parking places similarly to public transport users who walk to the nearest stop. In our strategy, this step is believed to further undermine the use of cars; car-less residents will feel less disadvantaged in line with Stead's reporting that limited residential parking may also indirectly contribute to less travel by suppressing car ownership [Stead cited in Stead & Marshall 2001]. In Eastern Europe where car theft is a usual occurrence, many private guarded parking lots have been established with janitors who watch over the cars day and night, these are sometimes situated as far as a fifteen-minute walk from the house and at a considerable expense.

Any empty plots or widening in the streets or at intersections within the car-free neighborhoods should be redeveloped into small-scale public squares with leisure activities like gardens or playgrounds for children or social facilities. These quarters should above all cater for differentiated target groups, and have local supply of basic foodstuffs and necessary services within a five-minute walk and be able to offer their residents a healthy, quiet and a greener pedestrian environment where residents are enabled to use the residential street as an extension of the house and where children can safely play and develop social skills amid attractive urban structures and under the supervision of elderly neighbors.

According to Pesch (2002), planning efforts in historic city centers should concentrate on cultivating the fundamental qualities of historic cities, namely their authenticity, city image and atmosphere, and these are exactly the same elements that are doomed to disappear if not for traffic planning which is compliant and reconcilable with the special nature of the historic center. What will mostly distinguish them from the emerging dormitory compounds in the suburbs is their central location, proximity and good accessibility to all essential services including jobs, education and leisure as well as their residents' independence from the automobile and above all, the noise-free, pollution-free and pedestrian-friendly environment. In Arabic city the dream of " a house with a garden" can become a reality in the central district.

Establish Car-Sharing Clubs
Electric Car-sharing clubs to further support the car-free housing will be desirable for the old city; in which the interested users subscribe to a club (at the mobility service point) where they receive a chip card and a pin, with the card they pay for

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the kilometers they will cover, but they will not have to bear the costs of insurance, maintenance nor parking (parking spaces for electric cars should be free of charge city-wide, as incentive to use these environmentally friendly vehicles that don't emit greenhouse gases). This will convince residents that using car-sharing is cheaper than possessing a car. Space for car-sharing stations should preferably be allocated after some investigation and discussion with the residents, at the fringe of some quarters 300-500m away, together with the limited parking provided for residents at the peripheral garages.

Additional points with this service should be available throughout the agglomeration.

Establish a Car-pooling Service Free of Charge:

Mobility service clubs should mediate in finding matches, especially commuters that work more or less at the same destination

5.4.1.2 Recommendations for Traditional Mixed-Use Historic Quarters Extra Muros like Jedaideh
• **Convert into an Encounter Zone**

In mixed-use historic quarters extra muros with increased demand on vehicle traffic (because of commercial and hospitality establishments) and a higher number of residents owning cars like in Jedaideh, the narrowness of the commercial streets, in addition to the high pedestrian volumes during the day demands concepts where the street spaces are shared by pedestrians, cyclers and cars alike, where pedestrians could use the whole width, and where cars move at very low speeds (maximum vehicle speeds allowed are 20 km/hour), it is recommended that such quarters are turned into a pedestrian-priority zone but with entry entitlement for cars, into a so-called "encounter zone". The concept pursues the following objectives:

- Mixed traffic at low speed levels with pedestrian crossing allowed everywhere within the street space
- Clearly more rights for pedestrians
- No suppression of cars
- Improved safety for the zone's users

During the field study in Jedaideh, one could observe that despite the disadvantageous conditions for pedestrians and the high flows of both, pedestrians and cars in such mixed-use commercial quarters, people and cars still managed to negotiate their way and engage with their surroundings. A so-called "naturally generated shared space" has been the outcome, but to a bigger disadvantage and risk to pedestrians who had to pay extra attention when moving around.

Thus by prioritizing pedestrians and introducing lower speeds for cars, a safer situation for pedestrians can be achieved and more advantageous conditions for all users to cohabitate together can result. Through appropriate design the environmental context of the quarter should be influenced so it emphasizes human presence in the area. This requires that the main entrances to the neighborhood are highlighted to create a gate effect upon

Fig. 5- 13 & 5- 14 Designating encounter zones in some streets of European historic centers have proven to function well even when pedestrian flows are high, in some cities (e.g. France) in one-way streets cycling is allowed in both directions.

entering to this mixed use area. Since the streets in traditional neighborhoods are narrow, curbs should disappear, and the street space should have the same level along its whole width. Especially in in the historic cities' pedestrian-privileged areas, such edges are unnecessary limitations and mere trip hazards. The driveway and sidewalks could be distinguished by means of different materials. The narrowness of the streets will additionally help in enforcing obedience of the low speed limits, so few additional changes to the street space would be necessary.

Therefore achieving safety and good environmental quality in mixed-use areas like Jedaideh could be achieved if through traffic was banned from cutting through the district and parking spaces for residents continued to be shared with parking spaces for businesses whereas long-term parking for cars belonging to merchants should not be allowed to park in front of their shops, they should be relocated to parking facilities outside the neighborhood (preferably automated), or if they come from outside the *medina*, they should come by public transportation otherwise they will incur high parking fees. Some short-term parking spaces along streets should be allowed only on marked spaces. Additional parking spaces for visitors should also be established outside the district's boundaries. It is justified by the fact that in such districts more residents own cars; also the mixed land uses put additional strain on the already scarce parking spaces.

Summary
The decision to pedestrianize large parts of the *medina* and devise car-free and car-reduced residential quarters supported by traffic-calming should be seen as a natural outcome of analyzing these historic organism and the benefits that it can bring with it to these *medinas*: not only will it help retain their historic character and enhance their quality of life as it will provide the much needed "open public spaces" that can relieve the over-density of many historic *medinas* and provide equilibrium to the lack of green open spaces, but such undertakings can also be important

agents for sustaining the economy of the historic city by supporting cultural tourism. As experience has also shown that extensive car-free areas proved supportive of tourism and leisure activities, these cities are able – by means of their attractive car and care-free environments – to entice locals and foreigners alike- escaping their hectic and congested urban areas to spend their free time there.

5.4.2 Recommendations for Modern Suburban Quarters

5.4.2.1 Recommendations for a Suburban Mixed-Use Quarter-like the Commercial Part of Sweifieh

Introduction:
The analysis of the traffic and urban situation in Sweifieh commercial center has shown that it is obvious that the area is totally dependent on visitors coming with their cars; in the short and mid terms, this will continue so. People in Arabic countries need to be given time to adjust to new patterns of transportation. Dependence on the automobile for long and short trips is expected to continue in Amman, thus a time frame is needed to allow for a gradual adaptation and change in the current habits like the obsession with parking directly at the destination.

• Manipulate Land-Use Planning at the Quarter Level
Most new developments in Arabic cities emphasize the commercial component but neglect cultural establishments. As more than half the population in Arabic cities is under thirty (i.e. in Amman 53% of the population is below the age of 25) it should be attempted to manipulate a fraction of these "highly mobile young elements" to carry out daily activities in nearby commercial districts by expanding the range of supplied services and leisure activities that are of interest to this group and improving their quality. This should include district libraries, theaters, cinemas, sports and youth clubs as well as public gathering places in form of small public squares, public gardens for mothers with babies or parks for picnicking; the need for such places is demonstrated by the popularity of forests and shaded green areas along major roads on the weekends.

• Introduce Traffic Calming
Which traffic-calming concept is most suitable for Arabic suburban commercial quarters?
<u>Convert the Area into an "Encounter Zone" crossed with "*Winkelerven*"</u>
In suburban commercial quarters and commercial centers where both pedestrian and car volumes are high, where single zebra crossings cannot cover the high demand on pedestrian crossings, where shops align on both sides of the streets, where improvement of the environmental quality, the shopping experience, and upgrading of the street spaces and privileging pedestrians are desired, it is recommended that a zone is devised and made easily identifiable to users especially drivers within the commercial

quarter. The zone can include the streets surrounding an existing "pedestrian street" (if already existing like in Sweifieh) or streets of similar character, where pedestrians have own allocated spaces but are permitted to cross everywhere, at the same time cars are not excluded, they drive at 20 km/h and short-term parking is allowed along the streets but only in designated areas. In the short and mid-terms, when dependence on the automobile is expected to continue until alternatives to the car are available in form of appropriate transit service, and where retailers fight for their motorized customers, coexistence streets are a better alternative to complete pedestrianization; they can reduce the impact of traffic, without giving up parking spaces or on accessibility to certain streets. At the same time some of these streets can be a prelude to future pedestrianization.

Transforming these centers into encounter zones will also upgrade the urban space of streets as many display deficits in design.

The outer collector streets surrounding the "encounter zone" on the other hand, could be turned into *winkelerven*, where pedestrians don't enjoy priority, but ample space is dedicated to them in form of wide sidewalks and sufficient safe crossings. At the same time maximum allowed driving speeds will be 30km/h. A condition for the viability of this solution will be that non-local visitors (shoppers and commuters intending to spend longer durations are encouraged to utilize the multistory parking garages located at the periphery which provide shuttle service across the area at fixed intervals, reducing on-street parking and turning it into paid-parking to avoid all-day occupancy by the same cars.

This is especially necessary in the Arabic context where people are prone to disobey the laws, especially when not enforced by the police, as on-street parking with mere signs limiting the parking duration has failed. This clearly shows the need to reduce on-street parking and transform it into paid-parking (installation of solar-powered pay-and-display multi-space parking meters) with charges exceeding those of parking in the multistory garages as a disincentive for long-stay retail and commercial parkers to park on-street and force them to use the off-street facilities and shuttle buses or else completely transfer to public transportation. Similarly businesses will be encouraged to give their employees incentives to leave their cars at home and use public transit to come to work, of course this will not be a viable solution before alternative public transportation means are available.

The encounter zone will be a controlled parking zone where priority in parking on-street is given to local residents and businesses who can park for free within specific well-marked parking bays but must display a valid permit. It should be attempted to make parking spaces in those zones used alternately by residents and local businesses based on "time zoning": businesses could use the parking spaces during the day, whereas residents could use them in the evening and at night. Spaces for loading and unloading of goods and taxi zones should be provided, this should be tailored on a block-by-block basis. In blocks where there is a

Fig. 5- 15 Traffic concept for a modern suburban quarter

Legend:
- BRT Station
- Bus Stop
- Car Parking
- Pedestrian Zone
- Encounter Zone
- Winkelerven

hotel, more passenger loading spaces will be needed and parking spaces for people with disablities should also be marked.

Other supporting measures:
- Organize awareness campaigns and better information that keep people updated with information about how to best move to and around the area, information about the locations of multistory parking facilities and the available services like shuttle buses, etc.
- Serve the commercial center with a rapid transit line that is complemented with bus lines that link the surrounding residential neighborhoods with the commercial center. Every station will be attainable within a distance of max. 300 meters
- Introduce unsignalized raised crosswalks on collector streets and intersections and pedestrian islands in the middle of the streets to avoid random crossing, introduce curb extensions to improve pedestrian visibility and safety while crossing the streets.

Extend Pedestrianization to a Larger Area:
Another option is to expand the pedestrian area, regenerate some adjacent streets, distribute attraction points and good urban design on a wider area so that pedestrian magnets are equally spread, and do not remain concentrated in one point (one pedestrian street). Similarly as in the centers this can save the extinction of smaller boutiques and businesses with lower yields, moreover merely linear or punctual pedestrian streets are to be rejected since they just copy the peripheral shopping mall (with whom they are competing); they don't introduce any new quality to the area [Monheim 1977].
If the pedestrian zone is to work properly, well-connected and attractive networks for non-motorized users (pedestrian and cycle paths) are to be provided that will link them to the bordering and near-by neighborhoods, to main public transport stops and

major jobs.

"Monderman's Shared space", on the other hand, could be considered an option for existing modern and inner centers of Arabic cities as well, but only for localized implementation at important spots like major intersections or in front of the Friday Mosque where demand on pedestrian crossing is very high but where access by car is also desirable. Similarly, sections of particular streets that require boosting can be transformed into a shared space, or when designing a signature street. Such transformation could also be a prelude to later pedestrianization. For instance, the New Road in Brighton, England for example, has shown that the success of this formerly run-down street after it had been redesigned as a shared space was so big that the high pedestrian volumes that the street attracted forced cars to omit and drive around it, rather than through it. Thus shared space also can be a prelude to complete pedestrianization.

5.4.2.2 Recommendations for Suburban Residential Quarters

Research conducted in European suburban environments has shown that if matters related to accessibility of suburban residential areas are left in the hands of residents, not planners, the chosen models would be "lower speed limits" and second "locating parking at the outskirts ". The least favored perspectives by the residents of suburbia on the other hand, have been the allocation of more space for cars or the transformation of their residential quarters into car-free areas [Svensson 2000]. Svensson concluded that this proves that the majority of individuals prefer scenarios where all kinds of road-users relatively safely coexist together on the streets, and where this condition has been reached by traffic calming measures. There is a strong tendency towards, and preference for a mixed traffic situation, distinguished by the absence of a dominant means of transportation. Even if access by car is desired by occupants of the residential areas, the majority have stressed the importance of guaranteeing safety and comfort for pedestrians, bicyclists and children playing in the streets. The re-

Fig. 5- 16 New Road in Brighton that became much livelier (62% more pedestrian traffic and 600% more staying activity) after it was converted into a pedestrian priority street in 2007 (source: Gehl 2010, p. 234)

Fig. 5- 17 & 5-18 New Road in Brighton
(source: Gehl Architects)

sults indicate that traffic-calming measures have a great potential to limit car traffic in urban areas.

The analysis in previous sections has shown that suburban residential subdivisions in Arabic cities have mainly been modeled on western suburban subdivisions (especially American) with a grid street pattern like in Riyadh and Cairo or grid patterns combined with loops and cul-de-sacs as could be seen in the Amman Sweifieh case study. Problems faced by these subdivisions resemble those faced by comparable subdivisions in the West. The lack of any provisions for children in form of neighborhood parks/ playgrounds, make the streets and some empty plots the only public play areas where they can play, but as streets are often too wide (especially collectors), with too narrow sidewalks, they are unsafe. The street space cannot fulfill an important requirement in residential quarters, namely to function as a social space for human interaction (safe child's play and for social encounters). The ability to play in the street without parents' surveillance and interact with other children, has proved essential for their physical and social development.
Among the neighborhood traffic calming concepts, the following can be considered for the Arabic context:

• **Manipulate Land-Use Planning at the Quarter Level**
Land-use planning's role for modern neighborhoods should be to restore the land-use imbalance in the often single-use suburban developments, bring closer what is needed but missing and facilitate the provision and use of alternative modes of transportation. In comparison to the historic cores, in Arabic cities modern neighborhoods have adopted western zoning policies that separated housing from work from commerce, thus the traditional socio-cultural activities' cohesion were affected and daily trips from sources to destinations increased, with it car usage. Different neighborhoods can differ in the level of their mono-functionality; residential neighborhoods in Arabic cities usually include local mosques that residents walk to on a daily basis, primary schools in addition to grocery shops (often on residential plots). But at this point the mix in uses ends. Other important amenities

like community facilities and open public spaces (neighborhood parks, gardens and playfields) are lacking.

Last but not least, the needs of the elderly must be accounted for, although in Arabic countries this group often lives together with their children who attend and carry out their daily needs for them, some tend to cover their daily needs independently in the nearest of areas.

The local supply of residential neighborhoods should be supplemented, existing commercial nodes situated in the residential areas could contribute in residents' orientation towards covering daily needs (grocery stores, vegetable, meat markets and pharmacies) in proximate areas, including the district they live in, thus reducing the number of trips, especially those made by car. This is dependent on the range and quality of services and available means of transportation offered in these areas [Beckmann et al. 2006]. It would be advantageous if new, centrally-located commercial nodes were created so that they could be reached within 400m, this could be possible as there are numerous scattered empty plots that could be used for this purpose.

• Introduce Traffic-Calming: which traffic-calming concept is most suitable for Arabic suburban residential quarters?

Convert to Tempo 30 Zones

Introducing Tempo 30 area-wide could be the most cost-effective solution to improve safety and the quality of life in Arabic neighborhoods, but it should come hand in hand with other accompanying measures. Traffic calming should become an intrinsic part of municipal planning in Arabic cities, where up till now it has been very incomprehensive). This requires anchoring the 30 km/h in the signaling regulation, extending pedestrian sidewalks and narrowing the roadways so they do not exceed 3.5 meters which will prevent drivers from going too fast. On perimeter collector streets and in front of schools and intersections, it is necessary to provide elevated crosswalks in combination with chokers and/or traffic islands or roundabouts.

Learning from the experience of European cities, it is recommended that a testing phase be carried out before endorsing the concept. For this, five Tempo 30 zones can be implemented as demonstration projects and consequently evaluated, this would be done to introduce the concept to people, bring awareness and gain the reisdents' support for a city-wide implementation.

Transform Chosen Residential Access Streets into Semi-Private shared Streets (Encounter Zone Concept)

Encounter zones' transferability to other "auto-focused settlements" and residential districts has been asserted by Swiss experts in the field [Schweizer 2006], thus the model is seen as appropriate for populated residential quarters of Arabic cities as well as for less populated, but auto-dominated suburban subdivisions. On some residential access streets, the shared streets (encounter zone) concept could be encouraged but without costly physical design. This entails putting in place appropriate signs at the entrances to such streets, or using simple designs to create a "gate effect" that highlights the transition to these pedestrian-priority streets where speeds will be legally regulated and limited to 20km/h, and where designated spaces for child's play are available (freed from parked vehicles). Instead of the gate, automatic bollards can be placed at both sides of the converted street.

Shared residential streets can be tradeoffs to the traditional semi-private urban spaces in residential quarters of historic *medinas*. The partial seclusion achieved by the gate effect or the closure has the ability to transform the street into an intimate "social milieu" and stranger-free space shared by neighbors living in that street, supportive of children's play and social interaction, to which residents get attached and regard as extension of their houses, and also feel a responsibility towards it as they often maintain and landscape the planting beds on the street near the houses. This suggests that shared streets could function as the missing semi-private spaces in Arabic cities. Reconciliation between innovative western urban planning approaches and Arab Muslim traditional culture has already been acknowledged in the 1980s. The semi-private outdoor space was typical in traditional residential quarters, its recreation will allow social mingling to occur without violating the principles of family privacy or religious observance [Costa & Noble 1986].

Creating these semi-private zones should stem from planners' cooperation with local communities by giving residents the right to decide what their streets should be like, which will anchor their responsibility towards their streets. Such jointly worked out proposals should produce custom tailored solutions that satisfy all partners. For instance, if residents' wish is to plant trees in front of their houses, planners should allow it but within rules, allowing for a strip of the sidewalk within which they are allowed to do this without obstructing pedestrians, or making decisions about the types of planting that should be allowed within one neighborhood, etc. Planners should consider residents' needs,

while ensuring that no decisions are made which would render the street dysfunctional.

Moreover, encounter zones can also be introduced point-wise, for example around schools or at train stations or any points requiring good accessibility by pedestrians and cars alike.

• Minimize Walking Distances by Retrofitting Existing Neighborhoods with a Majority of Loops and Cul-de-Sacs

Conventional suburban neighborhoods necessitate pedestrians to walk distances greater than what they want to walk, especially when the route is circuitous due to loops and cul-de-sacs. Many subdivisions in Arabic cities have adopted this standard Western hierarchic principle upon which street typologies are typically defined by traffic priority where primary distributors (arterials) carry fast traffic and most through-traffic, whereas secondary distributors branch from them and move into areas, from which local distributors in turn bring access to houses.

Although this functional hierarchic system has in many cases managed to shield residential neighborhoods from external through-traffic, contributing as well to safety and tranquility on residential access streets the principle has been developed with the automobile in mind without taking pedestrians into account, posing difficulties for the integration of public transit. If dependence on the car is to be reduced, then good access to public transit needs to be ensured; as distance to public transport stops strongly influences mode choice [Wegener & Fürst, cited in Petersen 2004]. If efficient pedestrian connections to nearby destinations and public transport stops are lacking, then walking to the next bus stop or to the local store will be discouraged if direct routes are missing, and overcoming loops or cul-de-sacs will prolong distances to destinations that otherwise could be reached within 400m if direct access was provided.

Naturally, improving pedestrian connectivity in existing neighborhoods is a harder task than when creating new developments. An interconnected pedestrian pathway system between cul-de-sacs or loops, adjacent streets, neighborhoods and open space systems needs to be established: the pedestrian network can parallel the vehicular ways, but can also take short cuts and connect the loops and cul-de-sacs with surrounding collector streets where bus stops will be located in the future. This entails the need to establish connections through blocks by acquiring easements from private owners to take space along their lot lines to create pedestrian links between two adjacent properties, or on the side of an empty plot (as houses are usually constructed in the center of their plots). Incentives will be needed for property owners (in form of financial compensations) after calculating losses incurred from opening those paths in order to get their permission. Such pedestrian paths should be a minimum of 1,80m wide, the walls on both sides (boundary walls) should be at least 2,2m and high enough to provide shade. Planted trees/palms within the private gardens could also contribute in shading and greening those pedestrian walkways.

Fig. 5- 21 & 5- 22 Pedestrian pathways created along the lot lines
of two adjacent houses in a suburban residential environment
(source: courtesy of John Lockerbie, www.catnaps.org)

Fig. 5- 23 Pedestrian pathways (in yellow) cre-
ated along the lot lines of two adjacent houses
to minimize walking distances (up to 400m) to
bus stops located on collector streets

• **Create Walkable & Cyclable Neighborhoods**
 Encourage Intra-neighborhood Pedestrian Movement with connected urban pedestrian & cycle networks

The analysis of the existing and updated land uses and specialized activity areas provide information on pedestrian destinations and flows. Walking and biking will only be encouraged if a high quality barrier-free pedestrian and cycle networks are provided, which link residences with activity centers and transit services (i.e. bus-stops located on the subdivision's collector streets and reached within walking distance). Paved and well-lighted pathways (possibly with some planting) will encourage frequent and safe public use. This should be further supported by crosswalk design improvements for pedestrians and cyclists alike. Access improvements for disabled pedestrians or mothers with strollers including curb cuts for wheelchairs, tactile strips as well as audible signals, should be provided.

Evidence has contributed to the finding that the more a residential neighborhood is walkable and equipped with a robust pedestrian network, the more its residents are willing to walk to a variety of destinations on foot when compared to residents living in an area with a fragmented pedestrian network, the former also encourages residents to explore more areas within their neighborhoods [Hrushowy 2006].

Without such a functional pedestrian network, pedestrian travel cannot be elevated to become a viable alternative that expands transportation options. Due to the big number of available empty plots, it is still possible to improve pedestrian connectivity pedestrian and bicycle paths (on and off-roads) to points of interest (between different land uses). Locating additional retail uses and community centers near the center of the subdivision, so they are reachable within a 5 minute walk from every point in the residential subdivision, is also of great importance. In case the location of new retail was not possible towards the center, it could be established on the redesigned arterials surrounding

5.4.3 Sketches of Redesigned Streets
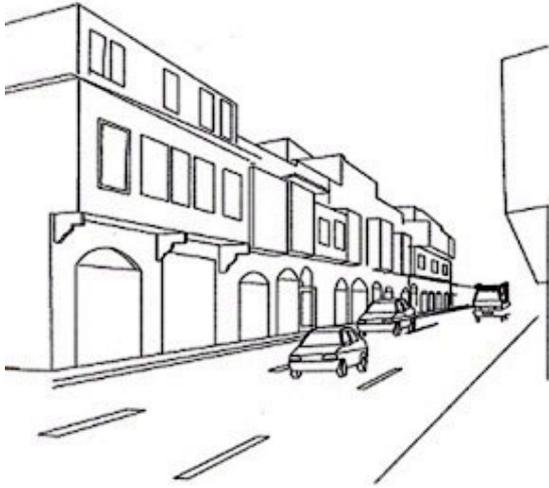
A through street in the *medina*

Before   After
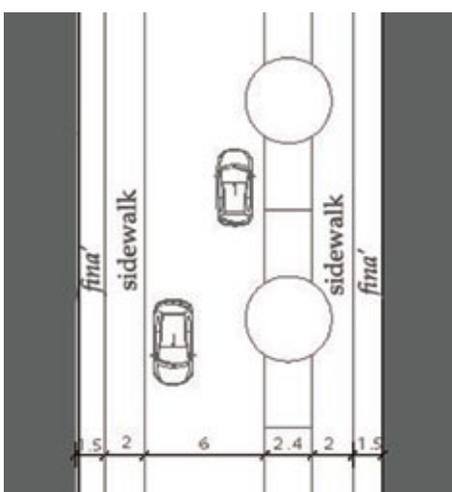
Leaving 1.2-1.5m in the *fina'* space for social, commercial uses, also for placing drinking fountains, and then leaving min. 1.8m for walking

A dead-end residential street in a modern neighborhood, converted to an encounter zone

Before   After
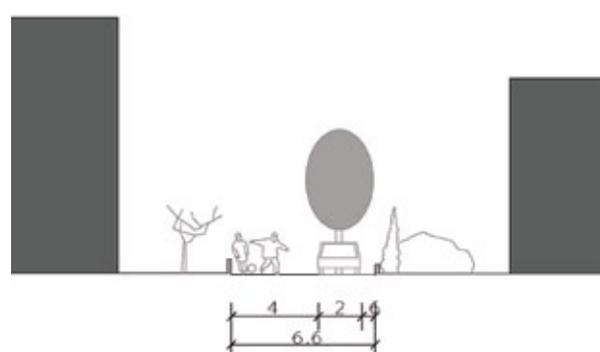
A collector residential street between the residential and commercial districts

Before

After

| 2.75 | 2 | 6.5 | 2 | 2.2 | 2.5 |
18
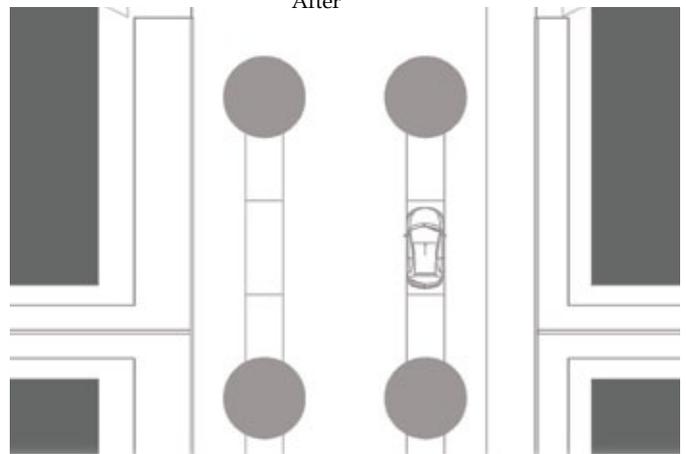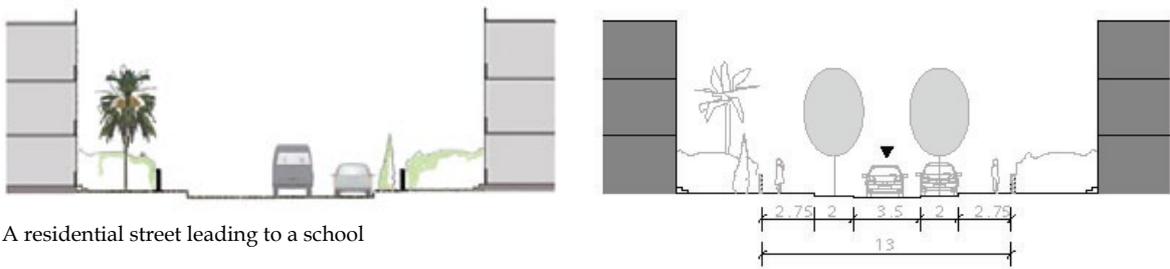
After

A residential street leading to a school

Before

After

| 2.75 | 2 | 3.5 | 2 | 2.75 |
13
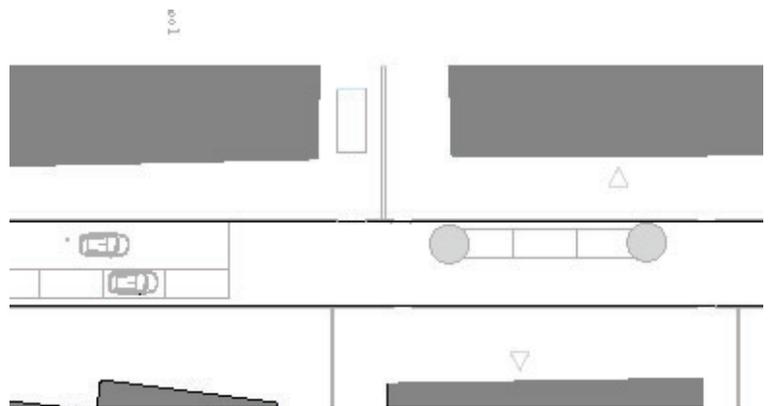
After

5.5 CONCLUSION: DEVELOPING ALTERNATIVE SOLUTIONS

Strategies transmitted from the "donor" European countries to "adopter" Arabic cities need to be chosen according to and further adapted to the specific context of Arabic cities by adjusting the solutions to spatial and non-spatial factors and conditions:

Developing Alternative Solutions
Adapt/adjust Urban Solutions to

The Specific Urban Form & Spatial Structure of Arabic Cities
- Specific Structure of Historic Arabic cities, narrowness of streets, hierarchy of filtered accessibility, semi-private residential street as extension of the house)
- Climate

Socioeconomic & Demographic Realities of Arabic Cities
- Car Ownership Levels
- Age Structure of Arabic Societies
- Income Structure/economic groups (social needs, poverty)
- Economically-based use of outdoor space
- Limited public funds

Specific Arabic Muslim Culture & Preferences
- Culturally-based Use of Outdoor Space, (entrenched use of *fina'* space integrate people's needs and settings)
- Religious-dependent mobility patterns (gender)
- Car as Status Symbol

Fig. 5- 24 Developing alternative solutions

5.6 General Urban Design Recommendations

Urban street design is a complex task, as in addition to answering the physical needs, it needs to answer the non-physical needs of people, who reside in or use those streets as well, and create "places" out of spaces with an authentic cultural identity. Immaterial needs have a strong subjective character and satisfying them is important for the psychological as well as physical well-being of people [Kossak and Unger 1997]. Finding the right fit between the physical and cultural contexts and the needs and aspirations is a major task for urban designers. Place theory in urban design says that a space becomes a "place" when it is given a contextual meaning derived from cultural and regional content. While types of space can be defined by categories or typologies based on physical properties, each place is unique, taking on the character or *Stimmung* of its surroundings. This character consists of both concrete things having material substance, shape, texture and color, and of more intangible cultural associations, a certain patina given by human use overtime [Trancik 1986]. Kossak and Unger (1997) believe it is a question of creating an "authentic experience" of the city or an urban area. Among the immaterial needs that they enumerate are orientation, social usefulness, identification, identity, stimulation and beauty. They believe that urban street design that attempts to deliver historic and cultural information about places by considering historic references, is not about recreating things that no longer exist, every epoch is equally important and should be engraved in the street, so it is futile to attempt to bring back the "original state of streets". Of the elements worth preservation or reactivation, researchers consider the town plan and the spatial qualities and connections between spaces (streets and squares), the visual dependencies but especially the diversity of uses and liveliness. Kossak and Unger further believe that historic references should not only be conveyed through physical structures, as they aren't sufficient for communicating the historic role. Establishing connections with historic events, personalities, population groups or uses is also important, as is the enrichment of the historicity or legendary identity. In Western planning, even the representation of less reliable references, is seen as legitimate.

In a globalized world, we have enough of places whose faceless architecture and urban spaces can be a reflection of other cultures and places, and could be located in many other places in the world. Across the Arab world, also within individual cities, we find streetscapes that are no longer recognizable by sight alone because of their dreary similarity and domination by cars, whereas the invaluable heritage of the *medinas* has been imperiled. We need our architecture, our unique urban spaces, and our streets that reflect our native culture, but which, at the same time, respond to worldly design standards of safety, comfort and design sustainability. Chapter I and Aleppo Case Study have served us to understand the street space and its development, the spatial structure and organization and intrinsic principles of traditional

cities, which enable us now to suggest some guidelines that relate to this past culture and establish continuity with it. In the following, some guidelines and recommendations on how to enhance the design of streets in historic Arabic cities, as well as in existing modern districts are given intermittently, it will also be shown if traditional urbanism can serve our contemporary urban street design:

5.6.1 Urban Design in Historic Urban Contexts

As was mentioned above, a fundamental trait of street spaces' historic quality is its development process and the goal behind design is not to freeze a street in a specific historic moment (snapshot), and rather, design should help achieve a better legibility of historic changes over time and a better ability to experience them. This means that historic streets need to be conserved for their historic and cultural values, their richness of humanity, their esthetic value and the rarity of their legacy as they tie the users to the past, to people and things. Considering historic references is an integral part of street space design in historic centers. Many issues are to be considered when rehabilitating streets in historic centers. In German planning handbooks for instance, matters related to the question of whether to maintain a new condition in the street or return to a "previous" state of a street are debated. Also decisions concerning which historic substance can be picked up and further developed, how does historic "paving" relate to today's demands for pedestrian comfort, or whether analogies could be made with the past, or the use of typical vegetation and furnishing. Other questions concern which traditional street elements could be picked up and pursued further, or how historic street elements can be pursued, updated and inventively modified for modern times. The ways of dealing with historic legacy are diverse and can also take the form of conserving authentic elements (of still available historic structures or materials), or reconstructing previous "historic conditions", or by transforming historic elements in new forms. The following is a list of a few suggestions:

Informative signage, maps and appropriate lighting should be installed that point to and explain both major architectural monuments (major mosques, *madrasas* etc), give clues and references to events or important personalities in the historic quarters bring back history and preserve the collective memory of the inhabitants.

In continuity with past traditions, it is recommended to allow for a space outside the historic walls (at the medina's periphery) where a weekly market could be organized.

Caravans also used to park outside the wall in special places, establishing car parks (for example electric car-sharing stations) at the periphery of the historic city outside its walls from the point of view of Muslim cities' development is the "natural place", but in order to avoid the effect of extensive asphalted spaces for parking lots, discrete designs of car parking structures that could be partly above and partly underground are preferable with ap-

propriate landscaping.

Enhancing and conserving the historic character of the townscape, restoring traditional street elements that are in a poor state, even if they no longer can perform their traditional tasks and mere restoration and renovation of such elements is desirable in itself, as it can testify to history and can add interest and identity to a place. An example of this is restoring a drinking fountain, even if there no longer existed a water supply to it.

5.6.2 Lessons from traditional urbanism that can serve our contemporary urban street design

In existing suburban neighborhoods such cultural physical substructures are hard to find as most subdivisions with their architecture are recent, lacking in history and modern in character. Here contemporary reinterpretation and recycling of traditional street elements, considering local, regional as well as geographic and climatic conditions and attempting to achieve comparable environmental and spatial qualities can reinforce urban identity and could enrich streetscapes. The use of local sustainable materials appropriate for the climate and setting (stone, wood, lattice work, iron grills etc) is also an important aspect to consider.

Trancik (1986) believes that historic cities have presented us with urban precedents from which we can derive and borrow guiding principles of good urban space, which keeps with the idea of the human figure being able to conquer the anti-space that has evaded our cities, a concept from which contemporary planning can learn and borrow from it, not imitating should be the objective. He believes historic models indeed can help us in restructuring modern urban districts by looking at them very closely.

In this sense traditional Muslim urban spaces, with their diversified spaces and environmental qualities should act as exemplary models for the upgrade of modern districts and in younger cities which have relatively little tradition or built heritage:

Respect Human Scale & the Pedestrian Dimension

Emphasis on the small hierarchy of scales should be reintroduced to the physical structure of contemporary districts including pedestrian links, creating the "city of short distances", but it should also incorporate man in ground floor design where focus is on the needs of the pedestrian, his scale and the presence of urban street elements in an observable manner.

Salingaros (2004) emphasizes that the "soul" of a city exists precisely on its smallest architectural scales (ranging from 1mm to 3m). This turns out to include the "detritus" which modernism tried so hard to eliminate -- unaligned and crooked walls, a bit of color, peeling paint, architectural ornaments, a step, a sidewalk tree, a portion of pavement, something to lean against, someplace to sit down outside, etc, he explains that we love a city only if we can connect to it intimately and if we can retain a warm memory of our interaction with it. This memory consists of visual, olfactory, acoustical, and tactile connections. Without a spatial intimacy connecting us to the smallest scales, urban space is ineffective;

this is why we need to create an emotionally nourishing physical environment, where there is visual excitement and one can enjoy physical movement, the thrilling experience of vibrant city life, the sensory stimulation from urban space filled with other people of different types and different ages.

Recreate the Urban Spatial Diversity and its Ambiances

The compensatory public spaces off pedestrian alleys in traditional *medinas* in form of different-sized courtyards, like the large central courtyard of the Friday mosque and courtyards of ancillary buildings in traditional Muslim cities, do not have equivalents in contemporary urban environments, and as shown in the case study of Amman, streets themselves, although wide and modern, are usually disrupted and invaded, and thus don't constitute adequate public spaces in themselves. Therefore turning the streets into places to be and spend time in should be complemented with other space typologies, such as small urban squares, urban parks, greened in-block courtyards and urban pockets. As was shown in the Amman case study, the interiors of the larger blocks in new commercial districts are dingy and largely underutilized and their design should complement that of the streets' space. These spaces have a big but unused potential and are currently used for the mere storage of automobiles. They have an architecturally unarticulated environment that should be better exploited with particular deference to human scale, greened and calmed, this will make up for the missing urban greenery and parks. They can continue to store automobiles but parking should be limited to designated areas only, whereas greenery, water fountains, extended sidewalks and arcades at ground floors should enhance the pedestrian environment. These can be turned into green shopping oases or resting areas with outdoor cinema, alfresco dining or cafés.

Coordination in the ground level abutting a street or enclosing a courtyard in the block interior is important to maintain a sense of cohesion and human scale.

This also applies to the diversity of ambiances these different traditional urban spaces offered side by side and the diversity of stimuli offered in traditional Muslim environments including visual, olfactory, acoustical, and tactile ones. The hustle and bustle of the souks could be escaped upon entering the courtyard of a *madrasa* or a mosque, where an air of sanctity, humility, which invites contemplation or meditation, is adorned by the sound of a water fountain. Bianca (2000) describes how this allowed a high degree of interaction between various social activities and religious functions. Each individual realm carefully retains its specific spatial character, while interacting with neighboring units through distinct architectural devices like intermediate gateways, internal passages, thresholds etc, an instance of this is the interaction between the main mosque and the markets, whereupon transition from the secular to sacred spaces, both contained within the same public section of urban fabric, is accomplished by a few steps.

When upgrading the urban realm of existing modern districts it is not only necessary to achieve unity, but to recreate a variety of ambiances and spaces side by side (by means of the above mentioned space typologies): commercial, lively places, but also more tranquil, culturally-oriented pockets should be created with shaded seating and greenery for one to stop and relax from shopping or from running in between errands. Boards with information about the history of a neighborhood etc, could also be provided. This creates diversity and interest; pedestrian paths should link these various social, commercial and religious destinations and churches and mosques should be better integrated into the quarters.

Enrich the Pedestrian Experience with different outdoor space typologies

Attempts should be made to recreate the richness of the shopping experience with a variety of street typologies and architectural devices borrowed from the historic Muslim built environment, like upgrading some streets into covered commercial streets (vaulted roofs with skylights) into enclosed market halls (*qaysariyyas*) or partially covered commercial streets with horizontal planes made of different materials like canvas or with solar protection like wooden lamella or glass or even horizontal planting roofs etc. Such spaces provided pleasant and cool environment that should be recreated in modern districts. Especially partially enclosed spaces like arcaded streets or internal galleries are an optimal solution for Arabic outdoor spaces, for they provide protection from direct exposure to the sun in the hot climate, allow air penetration and even eye-contact with the sky, all essential for the physical and psychological well-being of pedestrians. Furthermore, they create buffer zones that limit the energy consumption of buildings, and last but not least, they contribute to creating diversity. Although arcaded streets rather belong to colonial streets' heritage of Arab cities, they are still an important patrimony with great advantages for the Arabic urban context. According to a recent study conducted in Cambridge, these spaces remain much cooler than the open street space in summer and during the day, while the opposite is true in winter [Sinou & Steemers, cited in Reiter 2007]. Furthermore they provide a clear physical separation between pedestrian space and the driveway, so they offer a good solution if separation between different users and surfaces is intended by the design. Arcades are also a good unifying element for streets composed of different elements and stylistically different buildings.

Reinterpret Traditional Urban Elements:
Traditional urbanism has offered a myriad of urban elements as well that have enriched traditional Muslim streetscapes. Here contemporary reinterpretation and recycling of traditional street elements into contemporary design language is recommended. Also many devices served to improve the micro-climate and lessened the severity of exposure to the sun, hence reinterpretation and reintroducing these elements in contemporary cities is not

only desired for their benefits for the hot and dry climate, but as a way to produce culturally meaningful urban environments. A potential reinterpretation of traditional street elements like *sabeels* "drinking fountains" in a contemporary design and artistic language, provide drinking water for pedestrians in commercial streets and maintain the tradition of hospitability and generosity in residential streets (along pedestrian walkways), is desirable, as it does not only add visual interest, but can also act as accents or focal points on pedestrian streets, give psychological and physical comfort.

The traditional wind towers could also be integrated into the design of public spaces, as they can serve to cleanse narrow public spaces, and to cool *sikkas* (pedestrian paths), transit stops and gathering spaces by funneling moving winds to them from above (the higher the tower, the cleaner the air funneled).

Mashrabiyyas, awnings and architectural louvers create shade, protect pedestrians in public spaces from rain as well as from heat in the summer.

Create Enclosure and Edge Continuity:
Enclosure has been called "the fundamental concept of architecture in the Islamic world" as it relied on the contiguous courtyard tissue; a very significant percentage of a historic medina's structure is defined by the enclosure's walls. Streets were also well-defined and delineated by them. Belcacem [cited in Good 2003] has emphasized the importance of the enclosure of space in Islamic civilization as symbolic of the relationship between body and soul. Similar to private homes, public space was also enclosed if possible–covered markets, caravanserais, *madrasas*, and mosque courtyards. Therefore, continuity of the street wall is important for achieving enclosure and creating a setting for street-level activities appropriate to the area being redesigned.

In existing suburban quarters, it is mostly boundary walls that provide certain enclosure, but buildings are separated from one another. In new residential quarters, where direct pedestrian connections with neighborhood collectors are missing, it is still possible to devise paths in-between properties to provide shortcuts to these collectors where a prospective bus stop would be installed, or simply to minimize distances and create more route choices between the residential neighborhood and the surrounding districts. The boundary walls of adjacent properties can provide the lateral walls of these pedestrian paths. Of course, planning such paths in existing built-up areas (old housing stock), demands approval of owners, who will have to be compensated for the lost land area used for developing these paths.

Provide Urban Furnishing:
Here the principle "less is more" should be the guiding principle, and a profusion of superfluous and redundant street furniture (including traffic-calming devices) should be avoided:
Seating:
In old city centers, historic street furniture which reinforces local

character should be retained, reviving the abolished "*mastabahs*" in the space of the *fina'* abutting shops could be interesting, but these should be foldable as in the past so they don't obstruct emergency vehicles (if the street is too narrow).

In new districts, be it commercial, mixed-use or residential, urban seating should be made available, not only in the "resting pockets" and greened block yards and along pedestrian streets, but also along collector streets and at transit stops. Various types of seating should be provided: single benches that still preserve private space and distance from others can be distributed along the streets or at resting spots (to help ensure privacy, especially for women), but also seating arranged in talk-scapes (angled benches) that allow socializing and meeting in groups in urban spaces, especially important for families with children in Arabic cities.

<u>Urban Planting:</u>

Although planting trees in the streets has been uncommon in traditional cities, as streets are too narrow, trees have become part of streetscapes in new city quarters modeled on Western examples. In places where trees were not normally part of the streetscape (historic medina streets were usually treeless) the decision whether to introduce trees to newly upgraded historic spaces can be made after posing the question whether recreating the old condition is reasonable, or whether due to changed conditions trees are required [ILS 1992]. But trees could serve as a substitute in case of an urban gap, or to symbolize an earlier building line, or to mark older fortifications. At the same time there should be no anguish of simply blank cobbled urban spaces.

The introduction of trees in existing modern districts, on the other hand, is an important element of street design that could serve many purposes: rigorous planting could help bring unity to streetscapes with non-uniform building structures or showing strong disruptions caused by unfinished façade lines especially where many lots still stand free (like in the case of Sweifieh), in this case temporary planting can be helpful. Planting can also soften the streetscape, break the monotony as well as improve the aesthetics and the environmental quality of a place, can conceal failed façade designs or better define the roadside edge, as well as provide enclosure and contribute to the subjective safety of pedestrians if trees clearly divide the pavements they are walking on from the carriageways especially on feeder streets. Grouped trees can emphasize a "pocket space" like a resting spot, trees are supplementary devices for point-wise traffic-calming like marking the entry to a homogenous zone (i.e: a 30km/h zone, an encounter zone etc) marking entryways to a district, building a gate effect in combination with a choker etc.

But above all trees and vegetation in the warm climates of Arabic cities could also improve the micro-climate of urban streets, reduce ambient temperatures and provide a psychological cooling effect. Recent research has proved that sparsely spaced trees

(with trees separated by at least the width of their crowns) allows the air at street level to clear quicker, whereas streets where trees are planted too close together "trap" vehicle exhaust fumes and don't allow them to disperse [Gromke & Ruck 2009]. Hence planting trees along streets lined with tall buildings (densification corridors) is recommended. In most cases the most appropriate type of vegetation should be examined, drought-resistant trees and indigenous vegetation like palm trees, pine trees, bougainvillea over trellises etc, are preferable in the hot and dry context of many Arabic cities.

Floorscape:

Avoiding contrived geometric patterns, discordant colors and an excess of different paving materials in streets and relating ground surface to the local context in historic centers should be attempted. Maintaining or restoring authentic paving from the historic development of a place is preferable to applying new materials. Use of natural and traditional materials is highly advised. Through paving and surface design, it is additionally possible to mark out historic references in old centers and thus revitalize their historicity (for example: to mark the course of an older water moat in the surface of a street).

 In recent layouts, quality of the design should be the decisive factor in choosing surfaces. In pedestrian streets or encounter zones where vehicles are still allowed at walking speeds, flooring materials should not additionally highlight the differentiation between the driveway and sidewalk, as the strong definition of vehicle space will do little to reduce speeds.

Lighting

Adequate lighting is not only important for the safety of pedestrians, but it can also render the pedestrian experience more comfortable, enjoyable and attractive and hence it encourages more walking. One should avoid standardized lighting and choose the design and light source most appropriate for the area. In upgrading existing modern districts, differentiation between streets of one distinct quarter should also be decipherable through the type of lighting these streets have: while collectors and shared streets should have traffic and pedestrian oriented lighting, pedestrian and pedestrian priority streets should have lower, more human-scaled lamps that will underline the recreational character or the intimate character of a street. Also necessary is to ensure nighttime transparency at ground floor by placing shutters internally behind the window display and hence preserve lively streets at night.

Other issues to consider:

Securing functional street furniture (i.e. waste bins, benches, flower baskets (especially in historic centers and poorer neighborhoods) by anchoring them well to the ground (deep foundations) in order to prevent them from being stolen.

Here again public/private ownership and responsibility should be forged, municipal responsibility in choosing aesthetically

pleasing and suitable furniture that goes well-together, street furniture needs to complement the design of the street to achieve a unified character in an area.

As houses now are set back from the street and have boundary walls, refuse bins should be integrated within the boundary wall of residential neighborhoods of every residence, but farther away from the main entrance gate, the space should have two doors, an internal door for residents that can be locked (if total privacy is desired), an external door (towards the street) for waste collector men to be able to empty them with their car. Another option is for every street (or section of a street) to have bigger containers serving households located on one street; the containers should have a built structure discretely incorporated into the streets space. Or waste bins should be enclosed in a small architectural structure (container-like).

Incorporate People's Settings in the Redesign of Streets
Devise design regulations on an area basis but accommodate people's "settings" at the same time, by leaving a margin of freedom for people, which could encourage responsibility and more community belonging. In contemporary residential areas, as people have been accustomed to plant their own trees in the middle of the sidewalk, the new street design should incorporate fixed strips where residents are free to plant (in every area a range of plantings, comparable in size) can be considered. This will require sidewalk extension to accommodate pedestrians; this in turn can result in narrower driveways and hence induce lower speeds and less complexity and expenditure when introducing some physical traffic-calming. Only signs and gate effects at the mouth of the street can be sufficient to keep traffic at low speeds. In commercial areas, designated *fina'* spaces where commercial establishments display their ware in the streets or provide outdoor seating for their clientele, the width of the *fina'* should be calculated on its own and the sidewalk width then added to it. This means that the whole paved street will be widened, on both sides of the driveway; accordingly the driveway width will be narrowed, in line with traffic-calming objectives.

Consider all Stakeholders
Urban design of historic *medinas* or the upgrade of existing neighborhoods should consider all user groups, so planning in the *medinas* should integrate the needs of the original inhabitants (the residential community) with those of the national/international and global interest groups. This also means that pedestrian streets should improve the economy of the poor, in other words low and moderate income earners should also be able to gain a foothold in business, especially that many suffer from the blight of poverty, so instead of trying to eradicate them as has been the case so far, it should be attempted to allocate special spaces for hawkers in the redeveloped streets to display and sell their goods, their non-polluting transportation modes of sell-

ing their products could help support the eco-friendly zone and low-priced products. Another solution to overcome gentrification trends is the emergence of one-counter businesses which require little start-up capital; behind a number of storefronts, floor space is divided into four or five smaller sections each occupied by a different independent business. Examples of this exist in countries like Poland where downtown shopping malls' interior spaces are subdivided between numerous independent retailers and Fulton mall in the U.S is another example of this practice.

5.7 SYNTHESIS OF RESEARCH FINDINGS

It has been the dissertation's intention to be utilized as a guide by offering a conceptual framework that can shorten the process needed by Arabic cities to get on the path towards urban streets sustainability, hinder the continuation of application of already proven futile concepts, and make traffic calming an intrinsic part of the language and practice of urban planning in Arabic cities. But above all, the subject of the dissertation has been to unravel the essence of the unique urban structure and culture of Arabic cities, to understand the specificity of its urban outdoor space and its function throughout time as well as its contemporary socio-economic contexts so that on the one hand the solutions for urban streets could stem from a comprehensive understanding of urban culture itself, by referring to, borrowing from and looking up to "historic urban precedents" and characteristics that produced these high-quality urban outdoor spaces in an attempt to achieve (recreate) similar-quality urban spaces, on the other hand this has been necessary to understand what adaptation of foreign urban solutions to the local Arabic context entails
The research has unveiled that the concept of streets as an "urban social outdoor space" is not something of a novelty in Arabic cities, it has been an intrinsic part of the traditional Arabic cities, in which the semi-private residential streets have functioned as the extension of "home" as far back as the medieval times, and this, despite the fact that the typology of traditional houses offered internal private courtyards. Furthermore, the traditional use of the side space of the streets (the *fina'*) has demonstrated the importance of the street space for different social and commercial activities throughout history.

The new extensions and new towns that have been established since colonial times, introduced new street patterns modeled on foreign western concepts that were often unsuited for the context and climate in most Arabic cities. New streets have been pierced through the historic fabric with disruptive outcomes and new relations between indoors and outdoors have been established. Today, streets in contemporary Arabic cities have become wider and longer, losing the traditional humane scale and enclosure, and been transformed into monofunctional anonymous and undistinguishable spaces, mere storage space for cars and connectors for automobiles that are constantly congested. Indoors have gained the upper hand and an introversion of commercial establishments away from the streets has occurred. Interestingly, the morphology of urban neighborhoods in the expanding informal settlements is reminiscent of their counterparts in the traditional *medinas* with their exceptionally high densities, the percentage of building coverage, hierarchy of access and the narrow, almost car-free residential streets.

Many of the challenges facing Arabic cities today have faced industrialized European cities since the 1930s as they have grown,

like many Arabic cities, out from historic cores that were pedestrian based, and have narrow winding streets. Since the sixties, a wide palette of approaches and measures has been developed and the human dimension in outdoor space planning and "co-existence of street users" has gained the upper hand. Investigating these solutions and learning from European long acquired experience may well allow us to move faster towards sustainability and omit proven pitfalls, but adoption and customization of foreign solutions in Arabic cities requires pinpointing the differences and specific conditions of cities in the MENA that affect and influence mobility and accessibility.

The investigation has revealed that some characteristics of contemporary Arabic cities present fertile conditions for developing sustainable mobility. These include low car-ownership levels (both within the *medinas* and the cities on the whole) in many Arabic cities, high urban densities and the availability of fine-grained land-use mixes, especially in the central areas and informal settlements, and last but not least poverty. The informal settlements, like the *medinas*, are to a large degree self-sufficient areas with much of their population earning their livelihoods and covering their most important needs within their confines and on foot.

Nevertheless, some of this potential, like the low car-ownership levels, is restricted by time, and therefore there is a need for immediate action to take advantage of them before it becomes too late. So this study can also be regarded as a wake-up call and a call to action for urban authorities to act before the situation deteriorates completely and it becomes too late to steer Arabic cities towards sustainable mobility. Moreover, the fact that most of the population in cities of the Arab world is urban poor (mainly concentrated within the central area and informal settlements) means that their special demands from the streets must be considered by the authorities and urban policies. If these are not met, then we cannot expect to attract the urban poor away from the overly dense urban centers to the modern (planned) settlements and hence cannot help to contain urban sprawl. Not only does a large percentage of the population not own cars, and therefore is in urgent need of a functional public transportation, but social contacts and social organization in groups based on famN regional or religious affiliations, for these people, are paramount in everyday life, they depend on social ties and cooperation for economic survival, and the streets are treated by them (whether commercial or residential) as extension of home and the grounds for socialization which also compensate the lack of open spaces in the dense quarters as well as the lack of means to travel long distances for leisure purposes. Similarly, they depend on street vendors to acquire cheap food and goods. Therefore any planning that does not incorporate their needs and poor man's settings in the streets will prove futile.

Sidewalks then, need to be extended to make way for social and commercial uses in the *fina'* space, as well as ensure that they are functional pedestrian paths, otherwise pedestrians will al-

ways be pushed to the road, as the *fina'* space will continue to be occupied. Similarly, good connections by public transportation between the settlements of the urban poor and lower income employees and the central cities and other areas with a big concentration of jobs, must be established to hinder these elements from resorting to purchasing cars.

As to the introduction of traffic-calming concepts, the study has revealed that without a holistic approach with integrated concepts at different urban levels, road safety and a sustainable situation at the neighborhood level cannot be accomplished. Strategies on all urban levels: city, neighborhood and street levels are required by combining physical design with land use, with traffic management, multimodality, intermodality, marketing and educational campaigns, the aim being to achieve the highest levels of mobility with the least amount of motorized traffic.

Furthermore, the urban structure and the current socio-economic and cultural reality have indicated that traffic-calming in the historic cores of Arabic cities demands the limitation of motorized traffic and transformation of the quarters into traffic-free and traffic-reduced quarters. Such a solution can provide innovation and high-quality urban environments in the historic *medinas,* especially within cities plagued by traffic congestion and associated pollution. This should be seen as an investment in the future economy of these urban centers and towards reinforcing their status as attractive, family-friendly urban locations at the level of the whole city and in reinforcing cultural tourism and safeguarding the invaluable urban heritage in the *medinas*, by making them stand out as agreeable places for urban living, shopping and family leisure. Limited parking for residents needs to be foreseen at the urban fringe and emergency/service loops need to be established.

In existing residential quarters outside the central cities, with too much traffic or/and with many children, the tradeoff to the traditional semi-private streets can be the conversion of chosen residential access streets into semi-private shared streets (Encounter Zone Concept), whereas in mixed-use quarters outside the *medina* and in modern suburban centers where demand for accessibility from both, cars and pedestrians, is high, concepts of coexistence, where the street spaces are shared by pedestrians, cyclers and cars alike and where pedestrians enjoy priority but cars are not excluded, provided they move at very low speeds, are preferable to complete pedestrianization. In Arabic cities that up till now have lacked well-functioning public transportation, people should be given time to adapt to sustainable mobility patterns especially in car-dependent suburban developments, whereas classical street divisions into roadway and sidewalks in the narrow streets of the *medina* extensions *extra-muros* should be given up.

Finally, the study has shown that transmitting urban solutions from one cultural context to another and adapting them to the "unique" or "different physical and cultural context" of Arabic

cities entails adjusting these solutions to the specific urban form and spatial structure of these cities, to their socio-economic and demographic realties and last but not least, to the specific Arabic cultural preferences. As aforementioned, the specific urban structure of the traditional *medinas* and the narrowness of their streets, the hierarchy of filtered accessibility, the climate and the treatment of residential streets as semi-private spaces and extension of the house should be respected. The large percentage of poor people as well as young elements in the society, means that their needs must be prioritized to reduce the number of trips and their lengths Even when applying measures to streets in modern quarters, modeled on American and European models, the socio-economic and cultural factors still need to be considered. As the architecture of these quarters is far from being traditional, it is recommended to attempt to achieve the spatial qualities of traditional urban spaces in the new modern spaces as well, and it is encouraged to interpret traditional urban street elements in a modern and artistic way.

The ideas of change and freedom are gaining currency in the Arab world. If real change is to be achieved, then a paradigm shift needs to occur and the focus of authorities and planners should become the enhancement of the living environment of people - all people. They say mobility is freedom, but as could be seen, sustainable mobility is one that takes several key aspects into account: it is based on tailor-made solutions that stem from the urban context and rich culture of a place, yet takes advantage of worldly standards, it recognizes inherent local constraints, yet makes use of available potential. It is also one which allows urban dwellers, regardless of their age, gender or class, to move freely and to choose their means of transportation available to them at reasonable costs, yet with minimum environmental impact. The rewards of such solutions are precious, as they not only enable persons to enjoy their urban environment freely and safely, but they also allow to pursue livelihoods with dignity and combat poverty, all of which, are some of the most basic of freedoms.

TECHNICAL APPENDIX

GLOSSARY OF FOREIGN AND FREQUENTLY USED WORDS

Bab: a door of a house or a gate to a traditional Muslim city

Cul-de-sac: a dead-end, non-through road

Densification: the redevelopment of existing built-up areas to accommodate higher-density uses

al-Fina': an invisible space about 1.00–1.50 m wide alongside all exterior walls abutting a property – primarily alongside streets and access paths – and extends vertically alongside the building walls. It is owned and used exclusively by the abutting party (residents, occupiers). A party could use its *fina'* for different activities like trading, storing possessions, herding cattle, sitting and staying etc.

Hammam: a public bath serving residents of the neighborhood as well as clients from outside. It involved many rituals and is considered part of the physical as well as socio-cultural Muslim heritage

Infill Development (urban infill): use of land within a built-up area for further development usually on vacant land, on under-utilized sites or between two existing buildings. Suburban infill urges densification of land within existing suburban areas and is seen as a tool to reduce automobile dependence, encourage walking and ultimately save energy

Intensification: the development of vacant land located withing built-up areas

Khan: a structure where major wholesale trade and international trade was carried out, which also functioned as a hotel for local, regional and foreign traders and visitors. In addition to housing warehouses and workshops, it had rooms for rent. Its building was usually square or oblong consisting of a double or triple floor structure which opened onto the street by meaning of a single monumental gate and a central courtyard where pack animals stood. *Khans* were also called *wakalas*, *funduqs* and *samsara*, depending in which region they were located.

Madrasa: the Arabic word for school, but in the context of traditional Muslim centers it is a building which functions as a teaching institution primarily of Islamic sciences.

Mashrabiyya: a protruding window or balcony, enclosed with wooden grate or grilles, the word is derived from the niches used to store vessels for drinking water.

Medina or Madina: the Arabic term for "city", today it is used in

reference to the historic part of a city (the old city center or the traditional core)

Sabeel: a drinking fountain

*Serveece***:** the name used for Shared Taxis in cities of the MENA region , usually using white cabs
and therefore also called White Taxis

Settings*:* in this study it refers to the various activities and physical changes (patterns of usage) that Muslims have been practicing in the street space, especially in its *fina'*

Suzukies: in this study it refers to the Suzuki mini-trucks that are used for goods delivery in old Aleppo

Woonerven **(sing. woonerf):** a traffic-calmed residential street, which is transformed by means of costly physical design into safer places and outdoor "living rooms" for the residents.

*Winkelerf***:** a traffic calmed commercial street where pedestrians and cars have separate designated spaces with many possibilities are provided

ABBREVIATIONS

DOC: the Directorate of the Old City of Aleppo
GAM: the Greater Amman Municipality
GTZ: the German Technical Cooperation
MENA: an acronym for Middle East and North Africa
OC: the Old City of Aleppo

IMAGE SOURCES
All image sources are listed underneath the figures. If illustrations have no mentioned sources, then they are the work of the author.

The chapter cover images include:
Chapter I: A *medina* street in Tunis away from the souks
(source: Upyernoz, 'Medina Street Tunis' March 27, 2005 via Flickr, licensed under Creative Commons 2.0
(http://www.flickr.com/photos/upyernoz/7625632/)

Chapter II: Las Ramblas, Barcelona, photo taken by author in May 2010

Chapter III: Aleppo Citadel, photo taken by author in January 2010

Chapter IV: Wakalat, the first pedestrian street in Amman
(source: Courtesy of TURATH Consultants)

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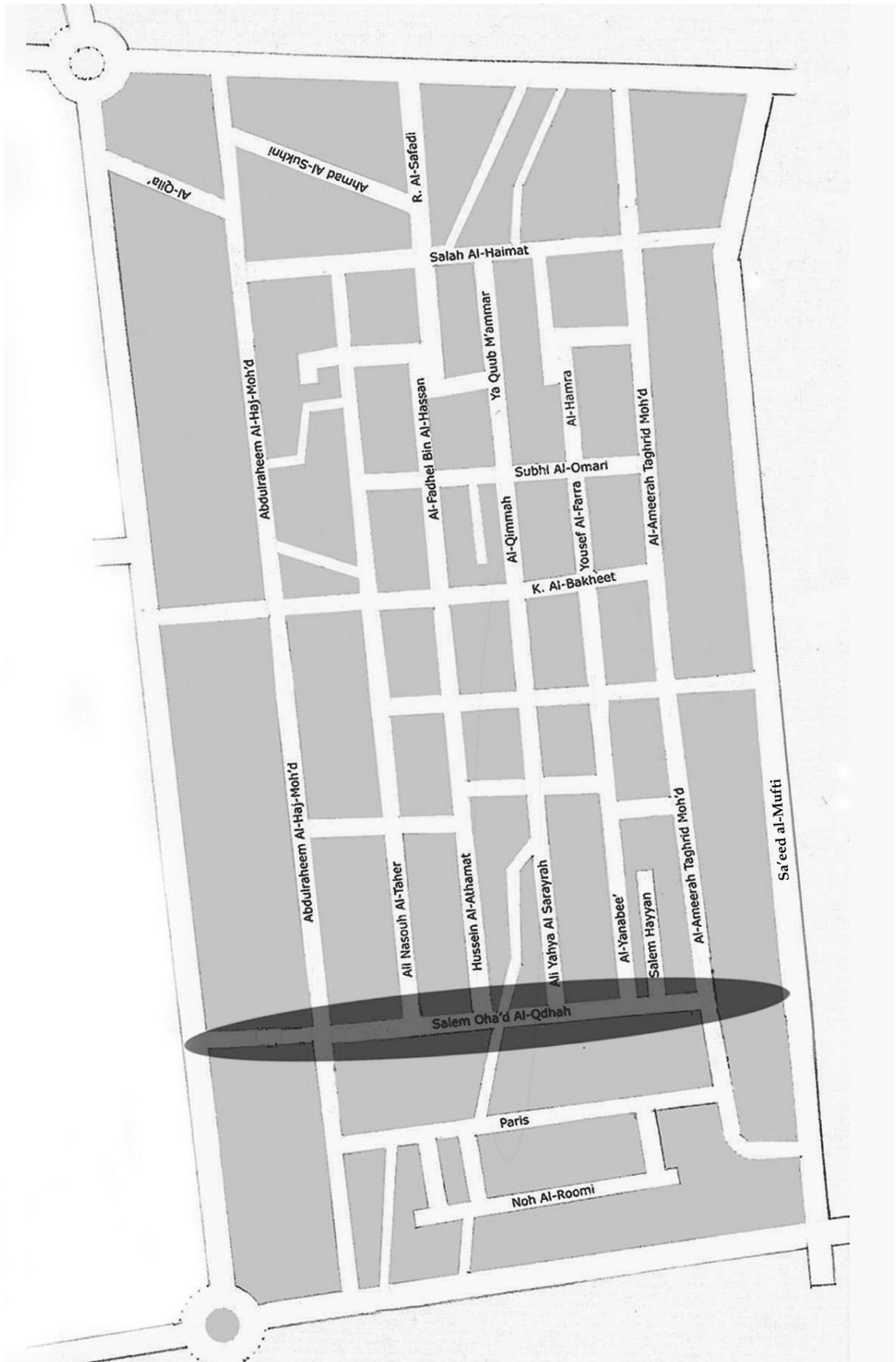
Kurzfassung Auf Deutsch

Strassen und Urbanität: *Perspektiven für eine nachhaltige Mobilität in arabischen Städten*

Aktuelle Studien zeigen, dass die meisten Städte im arabischen Raum heute unter Luftverschmutzung, Lärmbelästigung und eingeschränkten Bewegungsräumen für die Menschen leiden. Fußgängerfreundliche Straßenräume mit Aufenthaltsqualität und einem attraktiven Stadtbild sind eine Seltenheit geworden. Hauptursachen für diese Situation sind: Überbevölkerung (aufgrund politischer und sozialer Auswirkungen), Armut, und der Import ungeeigneter städtischer Modelle, die sich als schädlich für die traditionelle urbane Struktur erwiesen haben und zur totalen Abhängigkeit von privaten Autos geführt haben. Etwas zeitversetzt zu den europäischen und amerikanischen Städten hat die verkehrsgerechte Stadtplanung im arabischen Raum ihre Spuren in die Städte eingegraben.

Die vorliegende Dissertation entwirft als Gegenbild zur autogerechten arabischen Stadt eine kontextabhängige, auf die lokale Kultur bezogene Straßenraumgestaltung. Sie erarbeitet eine Alternative zur Kopie westlicher Verkehrsmodelle, die von der großflächigen Zerstörung der filigranen städtischen Strukturen zur Wiederbelebung wesentlicher Eigenschaften der arabischen Stadt führt.

Hauptziel dieser Untersuchung ist es, die Straßenräume – seien es traditionelle oder moderne – für die Menschen zurückzugewinnen, den Verfall der historischen Zentren zu verhindern, die negativen Auswirkungen auf die Umwelt zu verringern. Es sollen Wege aufgezeigt werden, die internationale Standards in Sicherheit, Komfort und Nachhaltigkeit mit der einzigartigen urbanen Struktur und Kultur der arabischen Städte zur Deckung bringen.

Fortgeschrittene europäische Konzepte für nachhaltige Mobilität und Straßenraumgestaltung können – so das Ergebnis der Untersuchung – nicht eins zu eins auf den arabischen Raum übertragen werden. Sie dienen der Orientierung, um vermaschte Netze zu entwickeln und den Handlungsspielraum in Abhängigkeit von der Verkehrsmenge auszuloten. Konkrete Entwürfe setzen eine Transformation auf den jeweiligen Ort voraus. Humane Straßenräume in arabischen Städten können nur in einem behutsamen und selektiven Adaptationsprozess entstehen, der die kulturellen Rahmenbedingungen und lokalen Gegebenheiten berücksichtigt.

Im ersten Kapitel wird ein historischer und morphologischer Zugang gewählt, um die urbane Entwicklung von Straßen in arabischen Städten zu analysieren – mit dem Schwerpunkt auf der traditionellen muslimischen Stadt, ihrer Struktur und der Typologie ihrer Straßen. Die Analyse setzt sich auch mit späteren Entwicklungsstadien der kolonialen und modernen arabischen Städte auseinander, um die Änderungen, die in den Straßenr-

äumen aufgetreten sind, zu berücksichtigen.

Der heutige Stand der internationalen Erfahrungen und Ansätze zur Straßenraumgestaltung und Verkehrsberuhigung werden im zweiten Kapitel analysiert. Hier wird gefragt, inwieweit die bereits entwickelten internationalen Ansätze Lösungspotential für vergleichbare Probleme in den Stadtstraßen des arabischen Raums anbieten können.

In den empirisch angelegten Kapiteln III und IV werden zwei Fallstudien dargestellt, in denen der Stand der Verkehrsplanung und Straßenraumgestaltung untersucht wird. Die Analyse erfolgt auf drei Ebenen – Stadt, Quartier und Straße. Im Fokus stehen schließlich die Stadtstraßen zweier Quartiere – der traditionellen arabischen Stadt Aleppo und der nicht-traditionellen arabischen Stadt Amman. Die Fallstudien weisen nicht nur auf typische straßen- und verkehrsbezogene Probleme hin, sondern sie stehen auch exemplarisch für die heutigen Praktiken der Stadt- und Verkehrsplanung in arabischen Städten.

In Kapitel V werden die Analogien und Unterschiede zwischen den europäischen und arabischen Kontexten zusammengefasst. Der Hauptteil dieses Kapitels dient der Formulierung von Empfehlungen für die Verbesserung der Straßen und der Verkehrsberuhigung im arabischen Kontext auf Grundlage der durchgeführten Untersuchungen.