AMERICAN UNIVERSITY OF BEIRUT

DEFENSIBLE URBANISM
AS A RESPONSE TO TARGETED AIR STRIKES
HARET HREIK (SOUTH BEIRUT- DAHYEH)
AS CASE STUDY

by
HASSAN ABDEL NABI AWADA

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AN ABSTRACT OF THE THESIS OF

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Title: Defensible Urbanism As a Response to Targeted Air Strikes
Haret Hreik (South Beirut- Dahyeh) as Case Study

Cities have been always exposed to war and designed according to the logic of defense. Each period's urban form is related to the available technologies of destruction (Misselwitz & Weizman, 2003). Since the middle of the twentieth century, the shift towards asymmetric warfare has radically changed the relation between war and the city, as warfare entered the sphere of the complex and densely populated environments. Yet, urban designers and planners rarely reflect on how this shift should impact the process of shaping and designing cities.

This thesis proposes to address the gap in contemporary urban design reflections in relation to "defensible urbanism" by investigating the possible strategies that urban designers can use to improve the capability of urban neighborhoods to provide a defensible environment for unconventional groups and guerrilla fighters in the event of targeted airstrikes, while maintaining a minimal level of livability and protection for city dwellers. Taking Haret Hreik (South Beirut) as a case study for a possible post-war reconstruction that combines principles of defense and livability, the thesis explores alternatives to the current and proposed urban design strategies for the reconstruction of this neighborhood following its severe demolition during the 2006 Israeli war on Lebanon. The thesis demonstrates the possibility to reconstruct the contemporary city and fortify it against the dominance of targeted air strikes, the most effective technology of destruction in the foreseeable future according to Israeli strategists.

In order to reach its proposal, the thesis first derived possible defensible forms from contemporary urban design approaches, or principles that support the ability of the city to act as a defensible environment in asymmetric warfare. The thesis then moved to balance those principles in relation to standards of livability as they are generically identified by planners and designers, selecting those five principles of "defensible urbanism" that coincide with the requirements of livability. These principles were then tested in a proposed alternative to the reconstruction of the neighborhood of Haret Hreik (South Beirut), which was rebuilt by Hezbollah without a clear consideration to these principles.

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CHAPTER I

INTRODUCTION

There is a direct reciprocity between war and cities. (Hewitt, 1983, p. 258)

As long as people have lived in cities, they have been haunted by fears of urban ruin . . . Every city on earth is ground zero in somebody's doomsday book. (Berman, 1996, p. 175-84)

The deliberate destruction of cities and urban places is utterly intrinsic to both urban modernity more broadly, and to modern urban planning and urbanism more specifically. (Graham, 2004b, p. 28)

A. Brief Overview

The logic of city defense has always been a priority since the early ancient eras as cities have been built fortified to survive and defend any outside invasions. "Cities have always reflected the dominant military techniques of their times" (Misselwitz & Weizman, 2003, p. 1). The term "defensible urban form" stated in my topic is as old as the 8th millennium B.C when defensible walls were built in Jericho to confront aggressors' invasions and conquests. The term "defensible urban form" is as old as Uruk in ancient Sumer (Mesopotamia), the most known walled city in the old world. It is as old as the Indus valley civilization in 3500 B.C when Harrappan people constructed defensible walls and large planned cities, and also as old as the ancient cities and settlements of Greek and Roman empires, and the complex geometrical layouts of Middle ages. In 1564, the military theorist and urban planner Girolamo Maggi published a military urbanism work called *Della fortificatione delle città* talking about the fortification of cities through *"indirect and soft fortification"* (Manaugh, 2010, p. 2). He depicts the city as urban judo and martial art

[1]when narrow walkways and indirect streets are used as "agents of spatial disorientation" (Manaugh, 2010, p. 2). How would the concept of *indirect and soft fortification* be interpreted in the contemporary city? What urban Judo and Martial art the city might use? Why is this urban judo and martial art neglected? Has it become inefficient now?

The thesis will start by recounting the development of warfare since 1911, the date of the first air strike documented in history when Italians Army attacking Libya. Then, the thesis will shed light on World War I and World War II, the periods when technology strongly entered the warfare machine and overcame the cities' from the air, and the periods when modern architects, and Le Corbusier specifically who attempted to manipulate modern principles of defensible urban form. Afterwards, the thesis will focus on how symmetric warfare has turned into an asymmetric one once war became urbanized and moved to cities starting the second half of the 20th century. In this asymmetric warfare, the thesis will investigate the tactics and technologies of the contemporary air force in tracking and targeting high density environments, and how the insurgencies and unconventional groups react to them by exploiting the urban form and operating within it. To make the asymmetric warfare clearer, it sheds light on the Israeli- Hizbollah[1] ongoing struggle to learn the latest contemporary lessons of this conflict. The thesis investigates the contemporary principles of defensible urban form and zooms in on a case study taken in the Lebanese context (Haret Hreik- Daheyh) to test those principles. Therefore, it seems

[1] Hizbollah (the Party of God) is best known for its leadership of the military resistance against the Israeli occupation of South Lebanon since its early foundation in 1983 (Qasim, 2002; Charara, 1996). Hizbollah is also an established political party in Lebanon with ministers in the cabinet and deputies in parliament. The Party also runs several non-governmental organizations that provide an array of social services in areas of predominantly Shiite constituencies (Fawaz, 2005; Harb and Leenders, 2005).

reasonable to understand the historical context of each period's urban form in relation to the available technologies of destruction, particularly aerial tracking and targeting, in order to continue re-learning old lessons and be inspired by them as well as compare them to contemporary problematiques.

B. Outlining the Main Thesis Argument

Since the middle of the twentieth century, changes in the technologies of warfare have radically changed the relation between war and the city. The turning of natural landscapes into urban areas demands a change in the nature of warfare by both sides of the conflict: the defender and the attacker. This has oriented the war course from symmetrical warfare to an asymmetrical one, and urban areas have become the primary battle spaces. The result is that warfare has become urbanized and entered the city again, the sphere of the everyday life (Graham, 2004b; Misselwitz & Weizman, 2003). Various problematiques in technologies of asymmetric warfare have emerged. One of the key problematiques in our era is the confrontation between the air force and cities' dense environments where urban form is shaped by defensible principles.

It is first imperative to define what the thesis terms a "defensible city". There are indeed at least two ways in which one can think of defensible city space. The first defines a "defensible city" as a strategy that protects the city by preventing any attacks from harming the city's population. The second begins with the assumption that the city is an integral part of the war and looks for ways to fortify it as a defensible place- often in asymmetrical warfare- for unconventional groups to, hide military equipment and facilities, and move

safely. In the latter sense, defense is part of a military strategy that can resist at best targeted attacks of selective destruction but not the blanket air bombing of the type observed for example in the 2006 Israeli war on Lebanon. In this thesis, I use the second definition of defensible city and focus on the targeted attacks done by the air force (vertical destruction). I investigate how defensible city spaces can diminish the impact of targeted attacks and facilitate the operations of unconventional groups.

However, any defensible city has to confront a human desire for a livable city where people can live with health and happiness. The World Health Organization (WHO) proposes standards of a healthy and livable place which provide amenities such as green areas, public spaces, walkability, better space ventilation and sunlight access... My thesis aims at creating a defensible yet livable city, and investigates the tension between the two concepts, looking for their possible intersections as the place to articulate design standards.

The complexity of urban form represents the general defensible principle for the city, where nonconventional groups exploit this complexity to hide and operate. Buildings mask targets and create urban canyons, which make it hard to see into the urban battle space, to communicate within it, and to use precision weapons, because radio waves are often disturbed and it is difficult to obtain accurate GPS satellite locations (Gregory, 2004; Weizman, 2003). Unconventional groups choose and exploit such complex environments as the basis for their operations, and blend into the cities' network and infrastructure systems. These dense environments with such an urban complexity diminish the advantages of high-tech air force in space tracking, and consequently, challenge its ability to achieve the intended military targets and agendas.

Moreover, the complexity of urban form challenges the high-tech air force's capability to differentiate between civilians and combatants, and consequently, to identify, track and target. This air force has poor assets for finding and tracking unconventional individuals and war targets that hide in dense residential environments (Defense Science board DSB, 2004). Moreover, the complex infrastructure grids "are now deemed to be the central 'battlespaces' in which terrorists and insurgents who are largely indistinguishable from the wider urban ground and thus can not be easily indentified, tracked, or targeted" (Crang & Graham, 2007, p. 13). So, we can deduce that the complexity of urban form is seriously challenging the high-tech air force.

In addition, a city with a large physical size is also a challenge to the high-tech air force and diminishes its ability to control and conquer. Most asymmetric warfare has been conducted in the global south where the scale of modern cities has increased and become more central in terms of area, population and various activities taking place within, including communication, economic, social and political activities. In case an attacker thought of conquering a modern city with a large physical size, Soffer describes eloquently a vision of what would happen the day after the conquest:

> The army would have to deal with hundreds of women giving birth and millions of hungry and wounded people. Hundreds, perhaps thousands, of guerillas would be active in the city, both underground (in public transportation and infrastructure tunnels) and above ground, in thousands of skyscrapers standing hundreds, even thousands, of feet high. Should a skyscraper collapse, all traffic in the area would stop because of the mounds of rubble that would block the roads. Guerrillas would

> traverse the area, and be present in residential buildings, sewers, shops, factories, hospitals, and public parks. All of this would take place within a human density unknown in the past. (Soffer, 2012, p. 10)

Therefore, the new military commanders and strategist in United States and Western countries find it unreasonable to think of conquering high density environments through land attacks and invasion, and rely instead on air as a space of battle through strategic targeting that depends on the air force. This targeting aims to harm the decision makers and eliminate, damage the communications capabilities, and locate the combatant blending in a civilian environment even if they are surrounded by thousands of civilians who are not involved in military operations (Soffer, 2012). Although this military strategy is easily incapacitated, it remains more efficient than any other force in tracking and achieving military targets and agendas due to the new surveillance systems that are always on. These surveillance systems unveil the movements of the human and non-human targets within the urban fabric, and record their activities. For this reason, a great efficiency has been done in the industries of military, defense and surveillance to benefit from these surveillance systems and support the air force.

The thesis question is:

What are the principles of defensible urban form, and how could they be adapted to an existing neighborhood in order to undermine the tactical and technological power of targeted military air strikes? How could these principles of defensible urban form be adapted/measured in relation to the concept of livability? Where do principles of defense and those of livability intersect in complementary ways?

Taking the neighborhood of Haret Hreik (South Beirut) as a case study, how could the principles of defensible urban form/ livability be adapted as urban design strategies in the post 2006 war reconstruction of this neighborhood, had that reconstruction accounted for it?

C. Thesis Significance

My thesis imparts knowledge and deep understanding of cities from a military urbanism perspective specifically for professionals directly related to the disciplines of urban design, urban planning, architecture, and military. The general topic of annihilation and reconstruction of cities is neglected and rarely acknowledged in urban design and planning science, as if it is a taboo which keeps the door open for improvised approaches, investigations and analysis. If the general topic is neglected, how could we integrate it in the reconstruction of cities from defensible and livable angles? The significance of my thesis refers to this reality, to the fact that it investigates a rare contemporary problematique associated with the survival and the existence of cities and nations. My thesis breaks the traditional understanding of urban design and planning in relation to warfare, by specifically attempting to develop our understanding of how to approach the city to defend it from the vertical destructive power of air force that is threatening its urban environments. For this reason, my thesis tries to strengthen the "immunity" of the city against its killer who continuously threatens and snaps it. Thus, my thesis fuses the theories of urban design and other urban planning standards and techniques into warfare

processes since it is the time to excavate the dark and miserable side of contemporary urbanism and respond to it critically.

D. Methodology

The methodological approach of my thesis is articulated around three main approaches:

1. *Analytical Work: Looking Critically at the Intersection of Defense/Security and Urban Design Theories*

In the contemporary era, urban design theories and concepts avert the relation between urban form and warfare, and rarely address how warfare can impact the process shaping and designing cities. This could be attributed to the inefficiency and difficulty in looking at or rethinking cities' urban form from the perspective of warfare, and particularly from a defensive perspective when advanced technology and precise weapons are controlling and dominating the urban form. Urban form seems passive, and defenseless under the military machine's thumb. When warfare is however enlarged to include contemporary so-called asymmetric warfare, the design of urban blocks, plots, infrastructure and open spaces becomes more interesting –particularly when it comes to blocking targeted assassinations.

The principles of defensible urban form are various, and generate from theories of cities' warfare specifically addressing dense cities, in addition to the available Urban Design concepts, case studies and visions outside the discipline of warfare. Theories of

cities' warfare explain minutely how nonconventional groups operate within urban form and exploit it, but go briefly over the defensible principles of urban form by stating vague, fuzzy and general terms and phrases such as complex, chaotic, deceptive and labyrinthine urban form. Those general terms and phrases are impractical, but if dismantled, investigated and illustrated through Urban Design concepts, they are able to broaden the understanding of defensible urban form in the contemporary era and give it a practical dimension through speculative urban design scenarios.

Moreover, the principles of defensible urban form exclude the underground city from investigation for two reasons. First, the underground city as an urban solution, does not deal with reality, with the fact that urban form is associated with a human life that exists, grows and breathes over the ground, and this is what seems to be the situation prospectively. Second, the signification and competitiveness do not lie in avoiding and escaping from the existing reality, but lie in facing it and in dealing with it, with the urban form of the city that exists over the ground. However, this does not mean to totally exclude the use of the underground where needed such as the underground tunnels, subways, shelters, and basements.

Within this logic, there are ten different principles of defensible urban form that will be looking at in this thesis. These principles are divided into two categories: eight principles defending the unconventional groups, and two defending the civilians. Those principles deal with four urban elements that represent the primary tools where landscape and architectural design take part: buildings (representing the private development), streets

and passageways (representing the infrastructure), public spaces, and landscape. The defensible principles could be classified into two categories:

1. Principles defending the unconventional groups:
    Principle 1: Irregular Urban Grid.
    Principle 2: Compact Urban Form.
    Principle 3: Interlocking Urban Form.
    Principle 4: Chaotic Urban Form.
    Principle 5: Landscape- Dense Green Areas and Corridors.
    Principle 6: Attached Buildings.
    Principle 7: Underground Tunnels.
    Principle 8: City at Night.
2. Principles defending civilians:
    Principle 1: Limiting Building Heights.
    Principle 2: Shelters Underneath Open Spaces and Empty Lots.

2. *Approach, Cross with Livability*

Based on the main argument of the thesis which assures that any city- defensible or not- has to confront a human desire for a livable place, the approach to my thesis is based on crossing the principles of defensible urban form through the concept of livability. While crossing, a tension between the principles and livability concept emerged which can be summarized according to four criteria specific to the scale and urban constraints of my

intervention area which is composed of two blocks of severe demolitions. I will apply on my area of intervention five principles that do not contradict the concept of livability and which are more responsive to it.

3. *Case Study Analysis*

Lebanon: an ideal presenter of asymmetric warfare. The modern history of Lebanon is characterized by warfare experiences, but the military conflict between Hizbollah and Israel has clearly revealed the asymmetric side of warfare. On the tactical and structural level, there has been a fundamental transformation in warfare conflict which was also obvious in summer 2006 between the two sides of the confrontation. Israel's forces deploy conventional, high-tech military units of a high signature due to the noticeable operations profile. In contrast, Hizbollah acts like an "unconventional groups" of low signature, meaning that its units are not conventional military units; they rather rely on camouflage, hiding among civilian populations, which makes it impossible to differentiate them from the city's populations (Harel, 2012, p. 19). Within this context, the built environment plays a major role in the tactics and strategies each side of the conflict is adopting since its morphology can facilitate or not the ability of military actors to hide in the city.

It is widely believed among the Israeli commanders that the most interesting aspect of this operating asymmetric warfare has been the conflict between the Israeli air force and the dense residential environments of communities that support Hizbollah in the Southern Suburbs of Beirut "Dahyeh", and villages in South Lebanon and the Biqaa'. The urban form of these dense residential environments masks targets for Hizbollah that operates in a

decentralized manner by blending in with the larger society as unconventional groups. On the other hand, the Israeli air force finds difficulty in tracking these residential environments, and identifying targets because Hizbollah's systems and facilities are integrated into the neighborhoods and are difficult to be figured out.

For these reasons, and after the 2006 summer war on Lebanon, Israeli strategists concluded that the "targeted killings" strategy would be the most efficient military strategy in dense residential environments (Soffer, 2012). Israelis have already asserted and clearly made dogmatic statement and conclusion to go to the maximum extent with this military strategy prospectively:

> In the urban warfare that has been imposed on it, Israel must attack every terrorist even if he has surrounded himself with dozens or hundreds of hostages. The elimination of these terrorists and their human shields will save a great deal of suffering to the populations on both sides of the conflict. It must be done. (Soffer, 2012, p. 13)

Therefore, and based on the previously mentioned factors, it seems that in the foreseeable future, the sky and land of Lebanon would continue to be a space for the Israeli air force to track and indicate targets, specifically in the residential environments of communities that support Hizbollah. There are three tangible evidences visible to the naked eye: In the sky, we can see the repeated reconnaissance flights of the unmanned aircrafts that enter the Lebanese air space for urban and human surveillance, and the repeated flights of the raiders which are ready for any military command to attack a selected target; on the land, we can repeatedly watch T.V news coverage of how the way

collaborators on the ground are equipped with high-tech surveillance systems and cameras for tracking and indicating targets in dense environments. It also seems that Hezbollah will continue to rely on the same strategy, given first the unequal balance of power that renders any other strategy unviable… and the fact that the party has rebuilt its headquarters and major agencies within the same neighborhoods where they existed prior to their demolition in 2006.

In the Lebanese context, Dahyeh carries a particularity in the operating asymmetric warfare due to the fact that the urban characteristics of Dahyeh match the urban characteristics of the most complicated and challenging areas for air force, specifically the one used by Israel. The three following characteristics make from Dahyeh a rich site for the Israeli aerial operations and a distinctive case study for experimentation as well.

First, Dahyeh has vertical and densely populated environments such as Haret Hreik, which represents the base to experiment the defensive principles of urban form. The urban evolutionary process of Dahyeh is under densification and extension. Empty plots are being filled by ten to twelve storey apartments, and low rise buildings are being replaced by high rise ones. Moreover, Dayheh is extending to Shwayfet towards the South, and to Baa'bda towards the East. This evolutionary process offers the bottom layer to experiment the defensive principles of urban form on Dahye.

Second, Dahye represents the strategic hub of Hizbollah. The area is the largest dense environment in communities that support Hizbollah. It is the main headquarters of Hizbollah's leaders and decision makers in Lebanon. Dahyeh is also the locus of the strategic centers and facilities that are located within the dense residential neighborhoods

(military, political, media, security, communication, and economic centers), in and near apartments, factories, shops, basements, tunnels, parking, and infrastructure, and perhaps even in sewers. This makes Dahyeh the richest site in secrets and strategic information, and the most mysterious urban space for Israel.

Third, Dahyeh experienced an asymmetric warfare in summer 2006, followed by a reconstruction process which is worth investigating to inform an understanding of the dimensions of defensive urban form. During the war, the Israeli high-tech air force tracked and repeatedly raided the high density residential environments of Dahyeh. While in the early days of the war, the Israeli air force followed the targeted strategy of the type analyzed in this thesis by bombing a particular building, in the second part, they followed the strategy of "urbacide" (Graham, 2004b) by annihilating several neighborhoods completely; the Israeli air force did not try to surgically destroy the apparatuses of Hizbollah and avoid civilian casualties, what happened was a type of urbacide. After the war, and in November 2006, Sayyed Hassan Nasrallah, the Party's general of Hizbollah, reassured that Al-Dahiya will be rebuilt "more beautiful than it was." This phrase was interpreted through Wa'd (the promise) project which was responsible for reconstructing the Southern Suburbs of Beirut. Within the framework of the ongoing asymmetric warfare, the urban design goals and objectives of Wa'd were to conserve the social fabric through the conservation of the physical fabric, within solely two years; the buildings, plots, blocks, infrastructure, and open spaces were all rebuilt similar to their original design. The defensible principles were taken into consideration by Wa'd, but could be done even more –as you will see in the thesis.

The area of intervention of my thesis is located within the municipal district of Haret Hreik, and the exact intervention within this district varies in accordance with the nature of the defensible principle whether it deals with infrastructure, massing, and/or open spaces. The exact perimeter of the area of study is defined as (see Figure 1.1):

- To the North, Chiyah Boulevard.
- To the South, Hazmiyeh Boulevard, Tarik el-Matar.
- To the East, Bir Al-Abed main street.
- To the West, Haret Hreik Main Street.

Figure 1.1. The area of intervention within the municipal district of Haret Hreik. *Retrieved from: http://dagobertobellucci.wordpress.com/2012/11/22/israel-crimes-against-lebanon-zionist-aggression-2006-destruction-in-southern-beirut-suburbs-dahyeh-haret-hreik-lebanon/*

Thus, my thesis seeks to experiment with the ten principles of defensible urban form and cross the concept of livability on this area of intervention through speculative urban design scenarios. In other words, my thesis intends to shift the phrase of Hizbollah “more beautiful than it was”, to the phrase "more defensible and livable than it was." The interpretation of my phrase is conserving the social fabric of Dahyeh by accommodating the existing community and population density within the same daily amenities, but changing the physical fabric into a defensible one able to diminish targeted killings but without ignoring the concept of livability. The issue here is not about a beautiful urban form only, but it is also about a defensible urban form that imports from urban design concepts a set of approaches or design strategies that could serve the defensible goals. At the end, my thesis test the success and applicability of those approaches or strategies on the urban form of the cluster of buildings in the neighborhood of Haret Hreik that were demolished during the 2006 war on Lebanon.

CHAPTER II

HISTORIC OVERVIEW

Cities gone wild in the name of resisting outside intervention. (Manaugh, 2010, p. 5)

War and the city have intimately shaped each other throughout urban and military history. (Graham, 2004b, p. 1)

While at one time war elsewhere guaranteed peace at the center of the empire, now the enemy strikes precisely and more easily at the center . . . War abroad no longer guarantees peace at home. (Eco, 2003, p. 7)

All dictionaries and specialists agree on the term "defense" as something that insures protection against an outside intervention. Once we mention the term "defense", we should mention “defense against what”, and once we realize “defense against what”, we should realize the tactics of defense. This chapter positions the urban design and planning discipline within this argument while it remains absolutely necessary to continue re-learning old theories and lessons to read the history at critical stop points to better understand the present, and to smartly predict foreseeable plans.

This chapter fuses urban design and planning with military decision making. It is an overview about how each period cities' urban form has been manipulated in relation to the available technologies of destruction. "Cities were always exposed to war and organized according to the logic of defense... they were measured , mapped and charted" (Misselwitz & Weizman, 2003, p. 1- 4). It is worth examining to investigate and perceive how the city has grown from the security and military perspectives. Hence, it remains absolutely necessary to locate the discussion within a critical historical framework in relation to past

extensions. The historical context of fortified cities is very long, but I will focus in this review on periods where the defensible principles of geometry has guided the design and planning of cities specifically after involving the vertical power "the aircraft" in the processes of destruction.

In 1911, Italy bombed Libya from the air, the first aerial bombardment ever recorded, celebrating the beginning of bombing from above period (see Figure 2.1). It was enough to make a revolution in military affairs and change both war and peace, as well as it was enough to reconsider the technologies of warfare, the technologies of destruction and reconstruction. Military strategists remained skeptical about the efficiency of the aircraft in battle for further more years. In 2011, the conference "Check and Awe: a hundred years of bombing from above" summarized the revolution of aerial bombing:

> It redrew the legal and moral boundaries between civilians and combatants. spread the theatre of war into new environments and expanded the battlefield, making cities into places of mass death and taking warfare into private - domestic spaces.

Each period's invention has been exploited to benefit each period's technologies of destruction. The third dimension of space (the vertical dimension) has shifted the tools of destruction and dominated the city from above. The aerial photography the airplane offers was a precious method as it enable to produce ‘ready made maps’ registering movements across the urban and natural contexts as well as registering any changes and variations. (Misselwitz & Weizman, 2003). World cities and settlements looked confused at the aerial military revolution- the bombing from above- questioning how to defend this feral aggressor.

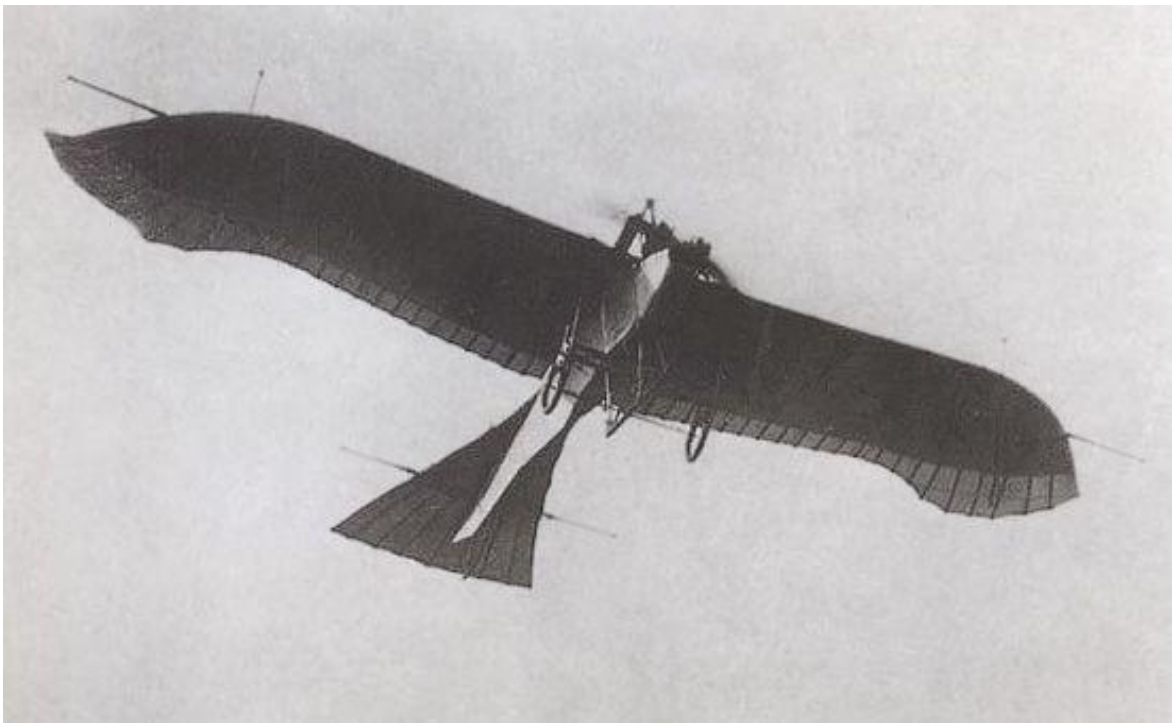
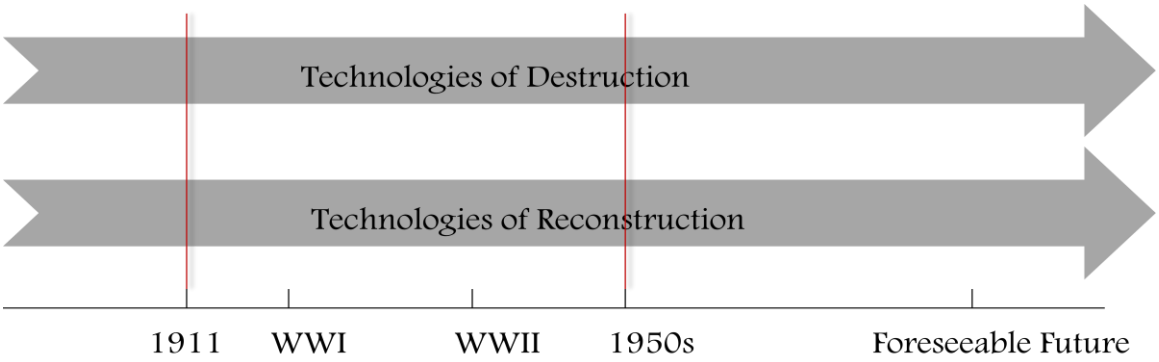


Figure 2.1. A taube monoplane as it might have appeared for the Libyans. *Retrieved from: http://www.aerospaceweb.org/question/history/q0061a.shtml*.

The first part of this chapter sheds light on the symmetric warfare in modern period to investigate the first reconstruction attempts towards designing a defensible urban form capable of confronting the vertical destruction machine. The second part focuses on the asymmetric warfare starting in the beginning of the twentieth century to analyze the struggle and the tensions between the high-tech air force vis-a-vis the complex urban terrains of global south urbanization, and what destruction attempts have been made to destruct those terrains. The third part of the chapter approaches a test case precious of rare information regarding Hizbollah's tactics in dense urban environments, and rare information regarding the Israeli plans and approaches in reaction to those tactics.

A. Modernist Approaches to Defensible Urbanism



This section investigates how post-war modern planning and reconstruction strategies have been influenced by the destructive power of air force. I will shed light on two main strategies stated in the literature of military urbanism which are regarded to be the first defensible attempts against vertical power.

1. *Design Scale: Suburbanization and Regionalization*

During World War II, the design intervention on a larger city scale was highly influenced by post-war phobia of nuclear destruction following the systematic destruction of cities as targets. Military strategists encouraged the systematic regional and suburban planning and instead discouraged the tendency to urban centers. " In Europe, this phenomenon is apparent almost everywhere and is well illustrated by the construction of a ring of new towns around London in the 1950s and by the planning of post-war Hanover" (Misselwitz & Weizman, 2003, p. 4) (see Figure 2.2). Similarly, Mizzelwitz and Weizman (2003, p. 4) argue that "the American suburb owes its existence as much to the fear of nuclear war as to the presence of the freeway. This was a preconceived and pre-planned scientific experiment in population dispersal,...".

Figure 2.2. Ring of towns around London. *Retrieved from: www.mappery.com*

2. Le Corbusier's City Radieuse

What a gift to be able to sow death with bombs upon sleeping towns. (Le Corbusier, 1935, p. 8-9).

In reaction to the vertical destruction power, Le Corbusier, the most famed modernist architect and city planner, was one of the first architect/ planners to be aware of vertical destructive power as it would be the "new theater of military operations" (Boyer, 2003, p. 111) threatening the urban existence. He approached the destruction of the city by the total demolition of its old core and replacing it by a modern utopia (see Figure 2.3 and 2.4). This utopian planning and housing schemes that he advocated had been proposed to solve the problem of work and recreation. We are less familiar with the fact that this solution also approached the city's urban form from a defensive angle to provide adequate resistance against aerial bombing and poisonous gases (Boyer, 2003). "Le Corbusier's famous obsession with loosely spaces modern towers set in parkland was not a just a celebration of light, air, and the modern house as a "machine for living"...(livability) but also a recreation to a widespread obsession in 1930s Europe with the need to completely replan cities so that they presented the smallest possible targets to the massed ranks of heavy bombers then being field by the major towers" (Defense) (Graham, 2004b, p. 38). These particular building types, "towers", tend to lay out free open spaces to reduce the exposure of city to aerial demolition (see Figure 2.4).

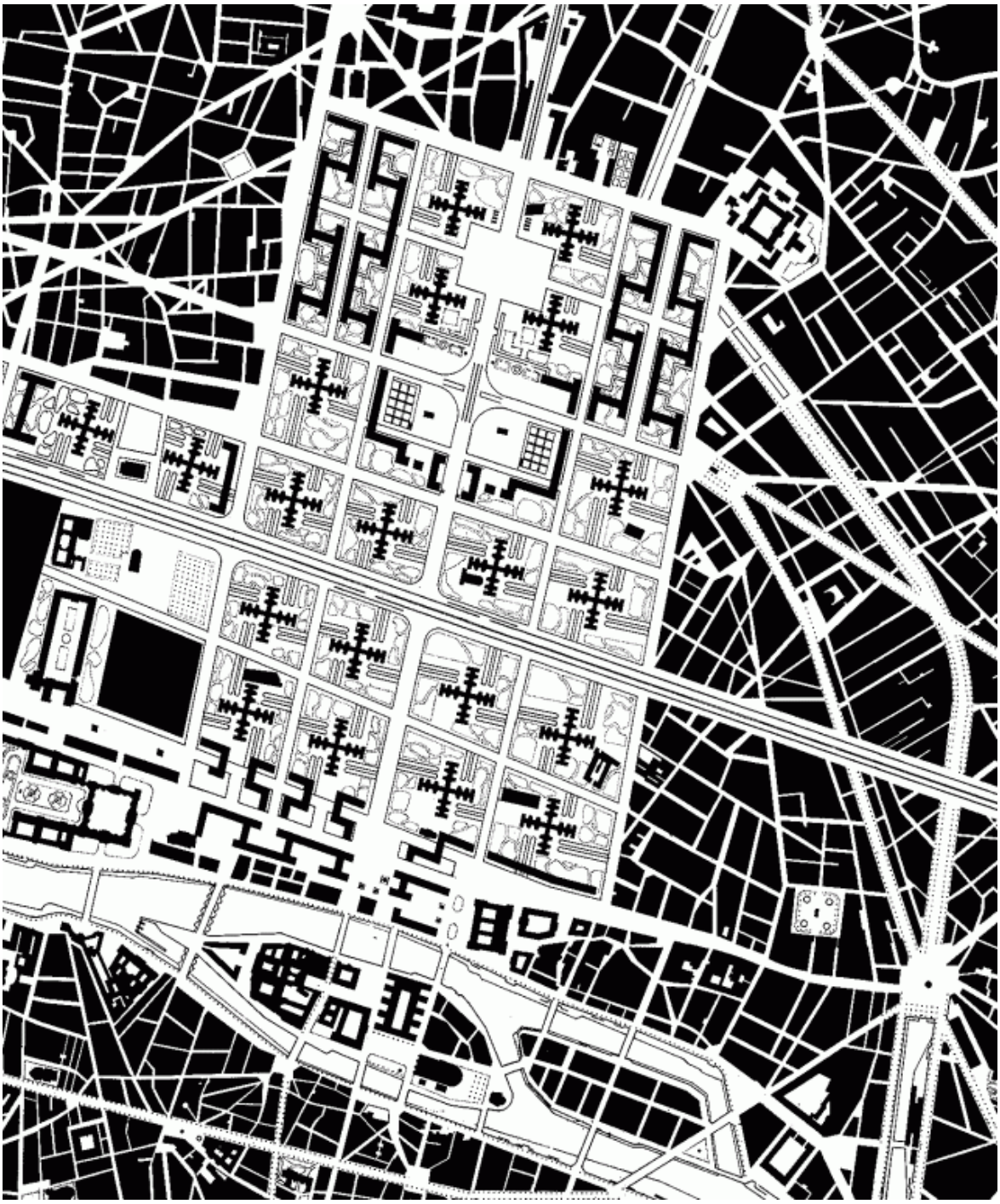


Figure 2.3. Le Corbusier's plan vision for Paris, 1925. *Retrieved from: http://paulvonplace.wordpress.com/2012/03/03/ive-never-been-to-wiesbaden-12/*

Figure 2.4. Le Corbusier's Radial City/Perspective. *Retrieved from: www.preceden.com*

Moreover, despite the fact that the aerial machine could have totally destroyed the city, Le Corbusier had already provided defensible strategies in his studies for Urbanisme (1925) and in his book Precisions (1930). "Le Corbusier understood that the threat of aerial warfare emanated not only from explosive projectiles that would destroy a city's built structures but also from poison gas and chemical warfare that would asphyxiate its inhabitants, and from flammable liquids that would spread a firestorm beyond imagination" (Boyer, 2003, p. 111) (see Figure 2.5). For this reason, he illustrated clearly and in detail how the safe and defensible city should be:

> Le Corbusier had proposed the construction of housing in reinforced concrete, a fireproof material strong enough to withstand the impact of bombs. He had also proposed that these structures be isolated in great open spaces, that housing, commerce, and industry be located in separate zones, and that the entire built surface of the city be reduced. These were essential conditions needed to lessen the exposure of built structures to aerial attacks also to contain the spread of any conflagration. To avoid the disaster of poisonous gas, his proposal for suppressing meager courtyards and narrow corridor streets, along with the provision of wide open spaces and housing raised on piloti, would allow sufficient wind and water from protected hydrants or large open-air swimming pools to cleanse the air. (Boyer, 2003, p. 111) (see Figures 2.5 and 2.6)

How could we approach the built surface in the contemporary city? Should we think of isolating it? Should we think of reducing it or the opposite? How could the major towers be safe and defensible? Are the extensive free open spaces defensible? How would the safer shelter look like? How could the raised houses on *piloti* be logical if there are commercial activities on the ground floor level?

Furthermore, Le Corbusier had reacted to the aerial threat through proposing what he assumes to be the ideal and safer shelters for civilians as the "noxious gases [would] pour into the trench-like streets and into the wells the courtyards provide; one can't get rid of them"(Le Corbusier, 1935, p. 48). To avoid the asphyxiation of residents, Le Corbusier proposed that "instead of underground shelters becoming the collective tomb of all who gathered there, bomb shelters could be located in the highest stories of apartment houses,

where pure air provided by air conditioners would allow the residents to breathe air in safety" (Boyer, 2003, p. 113), and to lift them above the attacks of poisonous gases (Marku, 2002) (see Figures 2.5 and 2.6).

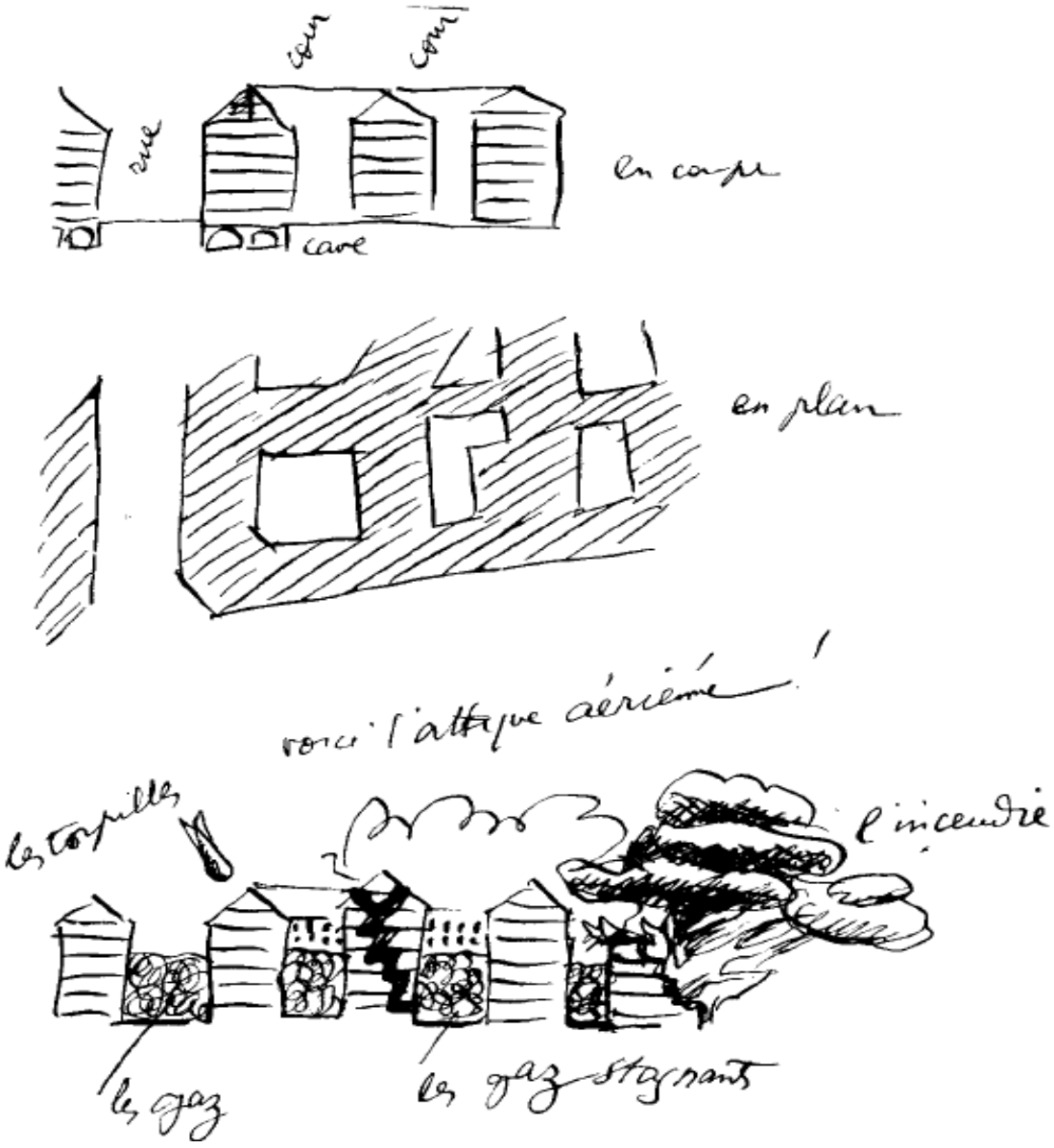


Figure 2.5. Le Corbusier's proposal for a safe and defensible urban form. *Source: Le Corbusier (1933)*

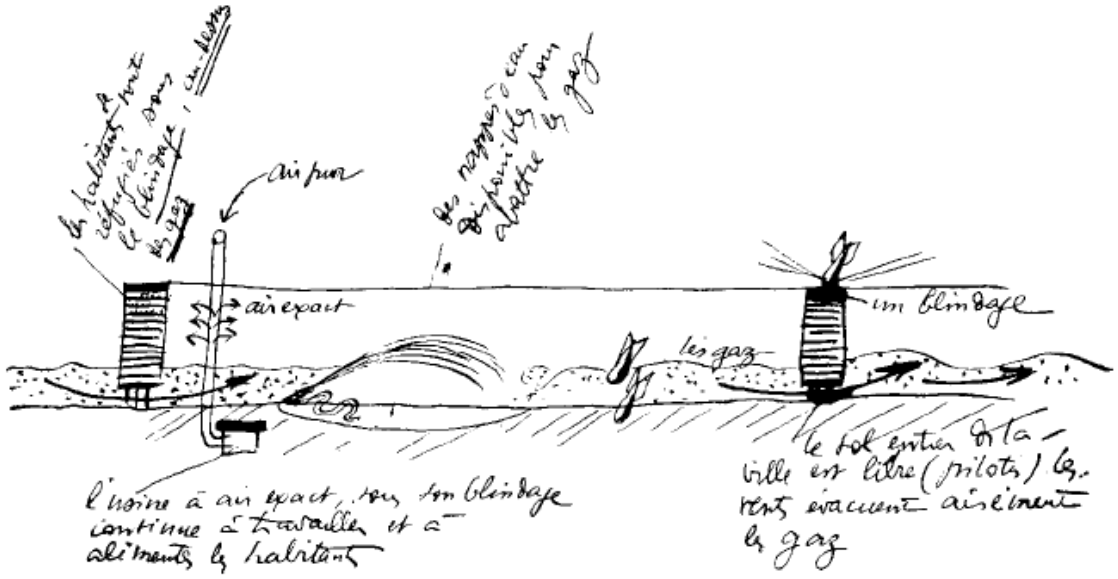
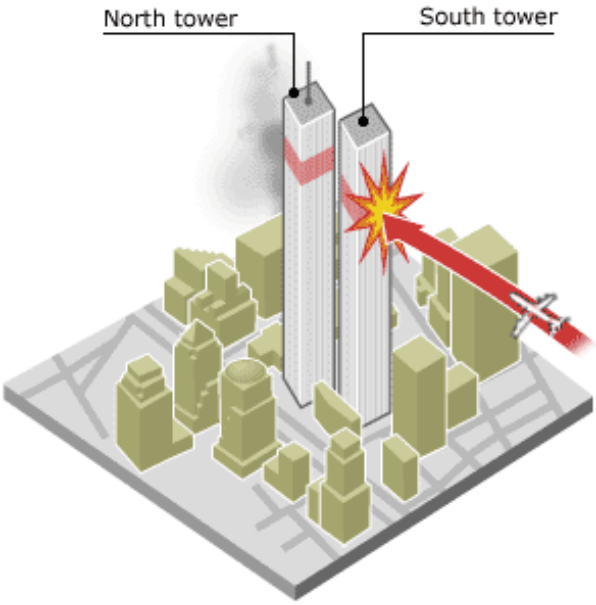


Figure 2.6. Le Corbusier's 1933 Ville Radieuse designs for apartment blocks and cities, which minimized the risks of aerial bombing and gas attack. *Source: Le Corbusier (1933)*

Thus, we can deduce that Le Corbusier has shifted the aerial threat and devastation into an opportunity to reconstruct a defensible and safe city as well as a livable one as he argues. As this opportunity had influenced the modernist architects and planners, what influence would it have in the contemporary era of extreme urban complexity on various levels? (See Figures 2.7 and 2.8)

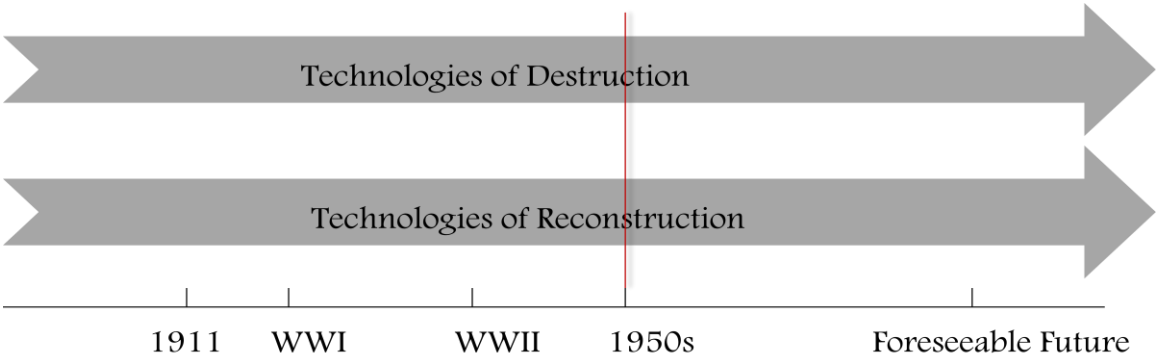


Figures 2.7 and 2.8. September 11th. *Source: Never Forget (2011)*

B. From Symmetric Warfare into an Asymmetric One: The City as a Space of Battle

Changes in the technologies of warfare during the last decade radically changed the relation between war and the city. (Misselwitz & Weizman, 2003, p. 1)

The city will be the strategic high ground – whoever controls it will dictate the course of future events in the world. (Dickson, 2002a, p. 10)



1. *The City as a Space of Battle*

Since the middle of twentieth century, the model of symmetric warfare between two conventional armies has been over and no longer relevant to the era we live in. "There has been a process of dramatic change in the history of warfare" (Soffer, 2012, p. 9). Dickson (2002), a US warfare theorist and military urbanist, argues that the asymmetric warfare in urban contexts will be the most challengeable of this century for the Western military forces.

The turning and the change of natural landscapes into urban areas requires a change in the structural and tactical level of warfare nature by the two sides of conflict, the defender and the attacker. "Today, areas that in the past were open have become urban, thereby not leaving the attacker any choice but to conduct urban warfare" (Soffer, 2012, p. 9). As a matter of fact, Houlgate (2004) notes that between 1984 and 2004, US forces fought 21 urban combats of 26 conflicts. There is no choice of the warfare to be conducted but in, and by the city. Therefore, "war has entered the city again- the sphere of the every day, the private realm of the house"(Misslewitz & Weizman, 2003, p. 1).

I found it necessary to position my argument within a broader narrative to prove how cities have become spaces of battle. The urban combats are a smaller picture of a bigger conflict best presented in the post-cold confrontation between the U.S and Western military precision power vis-a-vis the Global South urbanization specifically the Middle Eastern and city Arabesque. This military power try to control, dominate and unveil the labyrinthine urban environments (Graham, 2006) through "electronic mapping and satellite-image technologies which provide digital urban renditions that can be experienced

'immersively', forming a database of the Global South" (International, 2011), and through identifying vehicles, people, flows, and behaviors (Crandall, 2002). Thus, the opposition or unconventional groups will be forced into cities and other complex terrains. The 'elusive' and 'weak' insurgent and unconventional groups exploit the buildings and the city as a weapon to address the asymmetry of U.S and Western military powers. Battle spaces have turned into the interpersonal and domestic realm as well as the street level, houses sprawl, sewers, and high-rise buildings (War College's own journal). DIRC (1997) has clearly described those facts:

> Opposition forces will camouflage themselves in the background noise of the urban environments. Within the urban environment, it is not the weapon itself, rather the city which maximises or mutes an arm's effectiveness. Weapons hidden beneath a cloak, in a child's carriage, or rolled in a carpet, can get past security personnel undetected. (DIRC 1997, p. 11)

Moreover, one of the best fame quotes in military urbanism regarding insurgencies is the one by Iraqi foreign minister Tariq Aziz:

> Some people say to me that the Iraqis are not the Vietnamese! They have no jungles of swamps to hide in. I reply, 'let our cities be our swamps and our buildings our jungles' (Bellamy, 2003, p. 3) (see Figure 2.9).

Figure 2.9. Mosul. *Retrieved from: www.michaelyamashita.com*

However, at the time U.S and Western military forces are attempting to control the complex terrains through precision weapons, they are also confused of how they are being incapacitated. This tension has been investigated extensively in military urbanism literature. Houlgate (2004) argues that this time, the high-tech war machine of US is not anymore perceived to be that efficient in overcoming its enemy in urban areas. Similarly, Harris (2003) stated that the technological advantage of the current RMA 'Revolution in Military Affairs' (the producer of warfare technologies) has a negligible impact on urban combats and complex terrains. Moreover, Graham (2004b, p. 206) said that "surveillance at a distance via satellite systems has reduced power". Such a fear of complex environments and incapacitated technology has influenced the military strategists to think

seriously of avoiding entering cities and bypass their population and centers (Tamari, 2001). Therefore, the importance of the vertical destruction machine in asymmetric warfare came to the light from this fear (see Figure 2.10). Who will win? Could anyone declare who is triumphant? the ongoing fight does not intend to finish yet...

Figure 2.10. Baghdad. *Source: The week in pictures*

2. ***Efforts Towards Destruction: Abortive Attempts and Confusing Strategies***

In reaction to the asymmetric warfare and the fear of entering cities, the literature of military urbanism went over three strategies of destruction that seeks to destruct the city from above:

a. Attacking Symbolic Buildings

In 1999, NATO demonstrated that bombing symbolic buildings within the city would be an effective destruction tactic to overcome unconventional groups and control a city. NATO argued the this tactic would considerably exercise psychological pressure on the civilian population and the regime. However, symbolic buildings to be bombed were evacuated long before the bombs dropped. So this strategy of overcoming the city did not addressed the military targets and proved at the same time the that symbolism of buildings has no deterrent capability in warfare (Misselwitz & Weizman, 2003).

b. Reshaping and Replacing the Urban Form

Similar to how the planner deals with issues of development, military thinking tends to deal with the city from this angle to take it over. They look for methods to overcome the urban environment by managing and controlling the infrastructure, as well as by replacing the urban form and reshaping it to better manage it and the local population. (Misselwitz & Weizman, 2003). However, this strategy of destruction fits the occupied territories where military tends to intervene and reshape the built environment. But how could unoccupied cities be taken over and be reshaped? Within the ambiguity and complexity of the urban environments, how far are the stated advanced strategic planning and preplanned scenarios such as "controlling", "reshaping" and "replacing" possible and relevant?

c. The Campaign of Urban Warfare- Management and Coordination

Misselwitz and Weizman (2003) debate how could post-modern militaries manage and coordinate the campaign of urban warfare. The debate seemed to approach what I could call the "No Solution" as they illustrate how militaries are flexible and never surrender to urban form complexity, and at the same time, they depict how challengeable the urban warfare and somehow impossible to be managed and coordinated. Misselwitz and Weizman (2003) argued that the strategic thinking military never surrenders to the complexity that contemporary urban form is adopting. To the contrary, it always tries to find ways to deal with it.

> Complex ways of mapping which communicate the position of each combat unit... Each unit worked with the same aerial map, on which all building roofs were numbered. Central command could thus receive a group's position within the built fabric in terms of the X, Y (position), and Z (floor) coordinates. Rapidly updated information was achieved using helicopters, unmanned aerial vehicles [UAVs], or unmanned balloons positioned above the battle field, day and night. They delivered constant live updates on the rapidly developing situation on the ground and the transformed urban fabric. (Misselwitz & Weizman, 2003, p. 9-10)

And within the same argument, Misselwitz and Weizman (2003) themselves responded to the above post-modern military raising several question marks about its destiny and how far would it be possible:

> ...total chaos, where all the plans and preparations became irrelevant, the battle completely unexpected, dense, full of contradictions, with characters changing their

> role from woman to man, from civilian to combatant, from friend to foe. Chance played a more important role than the ability to calculate and predict. It has become impossible to draw up scenarios, plan next steps, or draw up single-track plans to follow through. This really shows that, as far as the military is concerned, urban warfare is the ultimate post-modern warfare: the belief in a logically structured, single-tracked and pre-planned approach is lost in the complexity and ambiguity of the urban reality. (Misselwitz & Weizman, 2003, p. 8)

C. A Test Case: the Hizbollah/ Israeli Conflict

According to Israel's approach, fighting should be short and achieve unambiguous results that allow a peaceful existence for the long term, whereas the other side talks of remaining in the existing arenas over time. (Harel, 2012, p. 19)

The Israeli- Hizbollah conflict represents a precious test case on multi various level. First, it reveals the hidden tactics of Hizbollah as illustrated by Israeli strategists and specialists. Second, it responds to these tactics through a gradual analysis to rest at the end on what the Israeli strategists believe to be the preplanned approach against Hizbollah in highly dense environments.

The asymmetric warfare strongly affects the way Israeli forces confront the challenges of urban combats in densely populated environments. In April 2012, Gabi Siboni, the Israeli colonel and senior expert on national security, military strategy and operations, military technology, cyber warfare, force buildup, and editor in the *Military and Strategic affairs* journal, published in four articles for four different Israeli experts

who wrote about Israel's experience in densely populated areas as it would be the main challenge for Israel's forces. These articles included lessons learned from the "so-called 2006 Second Lebanon War" (as they call it). I was specifically surprised to read detailed depictions of the tactics of unconventional groups such as Hizbollah and their analysis, and the formulation of so-called efficient preplanned approaches towards targeting Hizbollah.

Would Israel conquer a city of million(s) of large physical size such as Beirut or Cairo? If yes, then can we deal with civilians and guerilla fighters active within the urban form? Would it conquer strategic areas? Would Israel perhaps only capture or kill the leader(s)? Or kill the fighters? Would it eliminate the population of a certain city? Before answering these questions, it is necessary to understand first the 'urban form doctrine' of Hizbollah in dense environments.

1. ***Tactics of Hizbollah within Densely Populated Environments***

Israeli forces are a traditional and regular army of high signature that could be easily recognized, whereas Hizbollah, being an unconventional group, has elaborated its own tactics. This is what the literature of military urbanism be content with until Dan Harel, the Director General of the Israel Ministry of Defense, depicted structurally and systematically, how Hizbollah groups engage in what I could call a "regularized and systematized guerilla warfare". Harel (2012) describes Hizbollah groups as untraditional in the sense of a regular army that use the tactic of "disappearance" which lowers their signature. They are "dynamic and capable of change" (Mishal, 2012, p. 29) and it is hard to differentiate between them and civilians. They are very saturated and merge in the urban fabric and can change their scenarios and tactics in a moment (Mishal, 2012). It is very

difficult to understand how Hizbollah's systems are integrated into the urban form. Their networks are connected with the civilians' ones but they also maintain separate communication networks located underground that are not connected to the general network. "They have decentralized weapons caches so that they do not have to move arms from place to place. They try to stay far removed from their centers of gravity so that latter cannot be attacked. There are many combatants-tens of thousands- who operate in a decentralized manner within the civilian setting" (Harel, 2012, p. 19). Furthermore, decision making is no longer taken on the field of battle, but in offices and apartments (Siboni, 2012).

2. *The Preplanned Israeli Approach against Hizbollah*

As a result of Hizbollah's tactics in dense environments, Siboni (2012) argues that Israel's campaigns require an intervention in highly dense civilian environments which is not an easy decision. From this requirement, he stated that Israel forces have developed a preplanned approach to destruction consisting of three stages:

> First, the army attacks targets located in the heart of the population representing a clear and present danger...This point must be comprehensible to the public in Israel and abroad: there will be targets whose capacity for inflicting damage is such that it is necessary to attack them, even if they are located within civilian enclaves, without prior warning and in real time... One may assume that some of the targets could be justifiably attacked by precision fire even if located among civilians. One may assume that civilians would be harmed during such an attack...In the second stage,

> the IDF acts to move the non-involved civilians out of harm's way for their own protection...Only after undertaking an evacuation of sufficient scope does the IDF move on to the third stage, which includes maneuvering in the area and launching extensive attacks. (Siboni, 2012, p. 7)

But this preplanned approach represent a military proposal that needs a to be translated into an action against the dense urban form. This action is meant to be the contemporary tool of destruction.

Dogmatically, and without any introductions, the Israeli has concluded that:

> In the urban warfare that has been imposed on it, Israel must attack every terrorist even if he has surrounded himself with dozens or hundreds of hostages. The elimination of these terrorists and their human shields will save a great deal of suffering to the populations on both sides of the conflict. It must be done, while over and over again exposing the cynicism of the hypocritical moralists. (Soffer, 2012, p. 13)

So what would be the destructive tactic or solution that would ensure eliminating the "terrorists" and their "human shields"? From Israel's perspective, the ideal solution would be "targeted killings" (Soffer, 2012, p. 12) meaning that "locating the individual terrorist hiding in a home surrounded by thousands of non-involved civilians" (Soffer, 2012, p. 12).

Overall, this chapter investigated basic strategies of destruction and reconstruction throughout history in relation to the vertical destructive power to conclude that in asymmetric warfare, the most effective strategy of destruction against densely populated environments would be "targeted killings". The next chapter builds on this assessment to

investigate how the ground can defensively react to the air to insure the safety of unconventional groups and civilians and come up with different principles of defensible urban form.

CHAPTER III

PRINCIPLES OF DEFENSIBLE URBAN FORM

Yet, in urban combat, extending the field of battle into the third, aerial dimension was of limited use. Cities have a syntax that is not apparent from above. The defending party, whose city is its home, knows how to use this principle to the full and moves through secret routes and passageways, roof connections, and undergrounds. Colonial armies found themselves exposed to situations that are not dissimilar to contemporary 'asymmetrical warfare'. One contemporary military analyst went so far as to describe the developing city as 'the postmodern equivalent of jungles and mountains – citadels of the dispossessed and irreconcilable'. (Misselwitz & Weizman, 2003, p. 4)

Given that the thesis adopts for its definition of "defensible" the narrow possibility to respond to "targeted killings" operated by the air force, it is possible to explore a number of urban morphologies that can diminish this military advantage. Based on the literature of military urbanism, it is possible to identify the typologies of urban environments that limit the air power advantage. This chapter explores these typologies, showing how each provides particular advantages to the protection of guerilla urban warfare against targeted air strikes.

DIRC (1997) argues that in the asymmetric warfare against U.S and West military power, the informal settlements, favela districts, and the urban geography of slums in Global South cities favors the tactics of insurgent groups and unconventional forces, and that "the complex and congested terrain below, within, and above cities is seen here as a set of physical spaces that limit the effectiveness of high-tech space-targeted bombs, surveillance systems, and automated, 'network-centric' and 'precision' weapons" (DIRC, 1997). Glenn (2002) depicts the Global South cities as "jungle"- like environments that

benefit insurgent groups. Developing cities nowadays are depicted as chaotic, labyrinthine, deceptive and unstructured (Gregory, 2004), which are generating a three-dimensional complexity and complexity along the vertical axis of the city. This chapter will dismantle and deconstruct the understanding of the above- mentioned urban environments and illustrate them within a framework of urban design concepts. This framework is comprehensive, original and motivative for it broadens the perception of what a defensible urban form could be in the contemporary era, opens the door for multiple- layers of approaching and understanding the city, and raises several problematic questions urging to reconsider the defensible concept while rethinking the city. This chapter investigates ten principles of defensible urban form covering a comprehensive understanding of what urban environments are defensible in the contemporary era vis-a-vis targeted killings assassinations. The principles are classified into two categories:

A. Principles defending the unconventional groups:

Principle 1: Irregular Urban Grid

Principle 2: Compact Urban Form

Principle 3: Interlocking Urban Form

Principle 4: Chaotic Urban Form

Principle 5: Landscape- Dense Green Areas and Corridors

Principle 6: Attached Buildings

Principle 7: Underground Tunnels

Principle 8: City at Night

B. Principles defending the civilians:

Principle 1: Limiting Building Heights

Principle 2: Placing Shelters Underneath Open Spaces and Empty Lots

With reference to theories of cities' warfare specifically addressing dense environments as, and with reference to the above mentioned urban design concepts outside the discipline of military urbanism, this chapter investigates the following problematiques: How could those urban design concepts depict the defensible strengths of an urban form valuably, and how could they hearten those strengths and push them further by adding multi layers of understanding? How comprehensive are those strengths? What questionable and debatable issues would they add or bring to light in relation to reality? This chapter will shed light on these question marks and raise additional ones.

A. Principles Defending the Unconventional Groups

1. *Principle 1: Irregular Urban Grid*

Irregular street patterns generate an irregular urban grid that appears unstructured and misleading from the air. Regular street patterns such as the rectilinear or concentric grid pattern enable the air force to follow a systematic and guiding operations because they are structured, non deceptive, unambiguous, pertaining to a system and following an order (see Figure 3.1). However, street patterns of irregular and organic layouts force the air force to decipher a nonsystematic and misleading tracking process because they are unstructured, deceptive, ambiguous, do not pertain to a system and do not follow an order (see Figure 3.2). But how problematic will it be to replace an irregular urban pattern by a rectilinear one in an existing urban context? To what extent would it be logical? And to what extent

would it be applicable in already built areas? What urban constraints have to be considered? What scale of intervention is needed to insert the irregular urban pattern?

Figure 3.1. Regular Urban Grid- Mexico. *Retrieved from: http://www.thepolisblog.org/2012/12/urban-morphology-in-mexico-city.html*

Figure 3.2. Irregular and organic urban grid- Tokyo. *Retrieved from: http://opencityprojects.com/blog/aesthetics/the-beauty-of-getting-lost-in-tokyo/*

2. *Principle 2: Compact Urban Form*

The compact urban form has several defensible characteristics that diminish the capabilities of the air force (see Fig. 3.3). First, it produces claustrophobic alleys which mask targets and provide dark-shady urban spaces. Second, it decreases the scope of vision from the air into the space of the street or into what is called militarily "the space of battle". Third, the compact urban form in high-rise environments produces deep streets or what is called "claustrophobic alleys urban canyons" where the urban form looks similar to mountainous contexts: steep mountains depict high-rise buildings, and canyons depict streets; these urban canyons disrupt the ability of the air force to obtain accurate GPS

satellite locations and to indiscriminately shoot into the city (see Figure 3.4). Moreover, these urban canyons produce "supersurfaces of very high roofscapes...while the air between and above them is cluttered with complex electromagnetic fields" (Misselwitz & Weizman, 2003, p. 5). Thus, the more compact the urban form, the more defensible it is. This compactness is however in tension with standards of livability that seek to secure natural lighting and ventilation to all indoor and outdoor spaces (see Fig. 3.3).

Figure 3.3. Compact Urban Form. *Retrieved from: http://www.linkedin.com/today/post/article/20140407081153-10698301-are-compact-cities-good-for-you.*

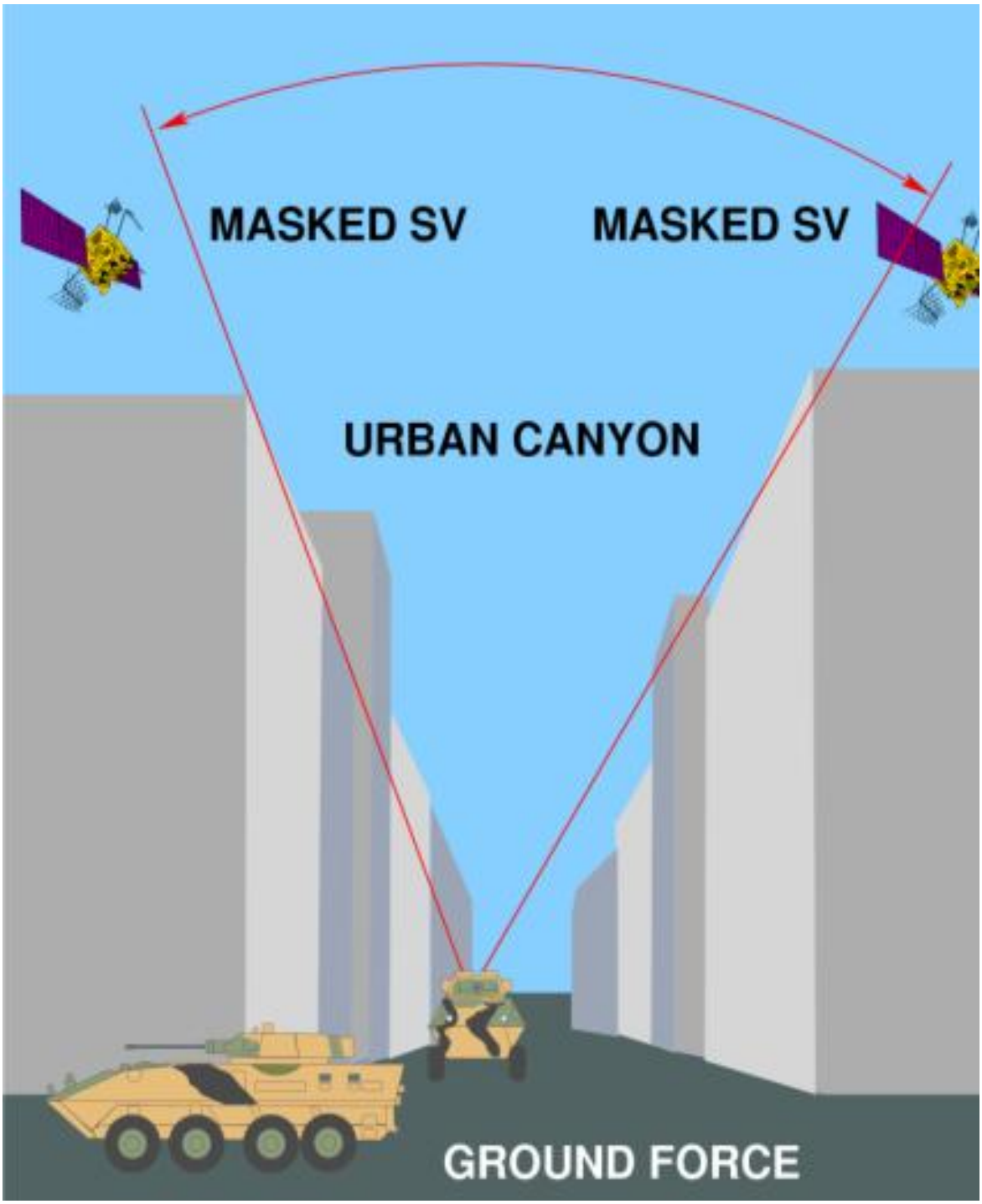


Figure 3.4. Urban Canyons. *Retrieved from: http://www.ausairpower.net/TE-GPS-Guided-Weps.html*.

3. *Principle 3: Interlocking Urban Form*

It will be designed to specifically address the "inherently three-dimensional nature of urban centres, with large buildings, extensive underground passageways, and concealment from above. (DARPA, 2003a, p. 7).

The integration of buildings, infrastructure, passageways, landscape and open spaces, provides what is called " interlocking urban form". Within such an urban form, spaces are accumulated vertically, covering each other up and creating what is called the " sheer three- dimensional complexity" (Graham, 2010, p. 3) or complexity along the vertical axis of urban space (Misselwitz & Weizman, 2003). The sheer three-dimensional complexity "undermines the United States' expensively assembled and hegemonic advantages in surveillance, targeting and killing through 'precise' air and spacebased weapons systems" (Graham 2003; Davis 2004b). It also diminishes the air force's capabilities to easily see into urban spaces (see Figure 3.5). This vertical complexity also produces complex horizontal-vertical circulations within the urban environment which makes it difficult and effort demanding that the air force follow the inhabitants as there are many alternatives of circulation for them while moving horizontally and vertically. In addition, it is hard for the air force to communicate in the interlocking urban form because it is difficult to obtain accurate GPS satellite locations, and it is hard to use precision weapons because radio waves are often disturbed (Weizman, 2003).

Figure 3.5. Habitat 67 in Montreal , Moshe Safdie. *Source: Montreal in Pictures (2012)*

4. *Principle 4: Chaotic Urban Form*

When infrastructure, public spaces, and architecture don't quite fit together well, they create morphological diversity with visual complexity on different scales and generate variety in architecture, colors, block and street patterns. This makes the city's urban form look more dynamic, more complex, and more chaotic. There are two types of urban form chaos: the unregulated chaos which is similar to the one existing in slums and informal settlements and mostly apparent in them. This kind of chaos does not intend to look chaotic, but it comes spontaneously most of the time without previous urban design and planning interventions of architects and urban designers (see Figure. 6). The regulated

chaos, which means to intentionally design the chaos within the urban form through urban design, planning and architectural scenarios (see Figure. 7).

Figure 3.6. South Africa. *Source: Dankie (2011)*

Figure 3.7. The "Brooklyn Model" project. *Source: Mitchell Joachim*.

5. ***Principle 5: Landscape- Dense Green Areas and Corridors***

I specified an independent principle for Landscape as it integrates in city's urban form and takes part in the defensible strategy. The green areas and corridors compose a horizontal partition separating two spaces: the air space over green areas and corridors dominated by air force, and the space underneath green areas and corridors dominated by inhabitants and combatants (see Figure 3.8). This horizontal partition has two defensible efficiencies: first, it diminishes the monitoring advantages of air force by ensuring a covered up and safe vehicular and pedestrian movement from one zone to another through green tunnels within the urban form (see Figure 3.9); second, it disturbs the vertical transmission of electromagnetic and radio waves issued from the two spaces: the air force will not be able to accurately capture the source issuing the waves as well as to precisely

obtain accurate GPS locations. Moreover, green areas and corridors provide non built spaces necessary for proposing safer shelters underneath them (this will be discussed later).

Figure 3.8. Dense green areas and corridors. By H. Awada (2014).

Figure 3.9. The Rua Goncalo de Carvalho street. *Retrieved from: http://www.ekokuce.com/vesti/zanimljivosti/najlepsa-ulica-na-svetu-se-nalazi-u-brazilu*

6. ***Principle 6: Attached Buildings***

The attached buildings make it hard for the air force to identify building outlines and distinguish among them. However, the design of the top roof should follow the same physical form, the same pattern and the same color to camouflage the building outlines. Thus, distinguishing and unrecognizing a single building from sky becomes a very hard process for the air force. The longer the attachment, the more defensible it will be because this lets the air force perceive and assume that there are several buildings of unidentifiable top roof outlines. However, when the attachment is short, this lets the air force perceive and assume that the attachment is a one mega building of identifiable outline. Consequently, the attached buildings will lose and its defensible meaning and effectiveness (see Figures 3.10 and 3.11).

Figure 3.10. Lucca, Italy. *Source: Tourist Guide MICHELIN - TUSCANY (1996)*

Figure 3.11. Saifi Village, Beirut. *Source: Solidere*

7. *Principle 7: Underground Tunnels*

The underground tunnels are the most fame and defensible technique that have been used in the urban form through history. This refers to the fact that it is totally absent from the eye of the attacker. They are surprising and extremely hard to be tracked and targeted precisely. The border of Rafah in Gaza strip is well known by the underground tunnels which have been proving how defensible they are vis-a-vis the Israeli air force (see Figures 3.12 - 3.14).

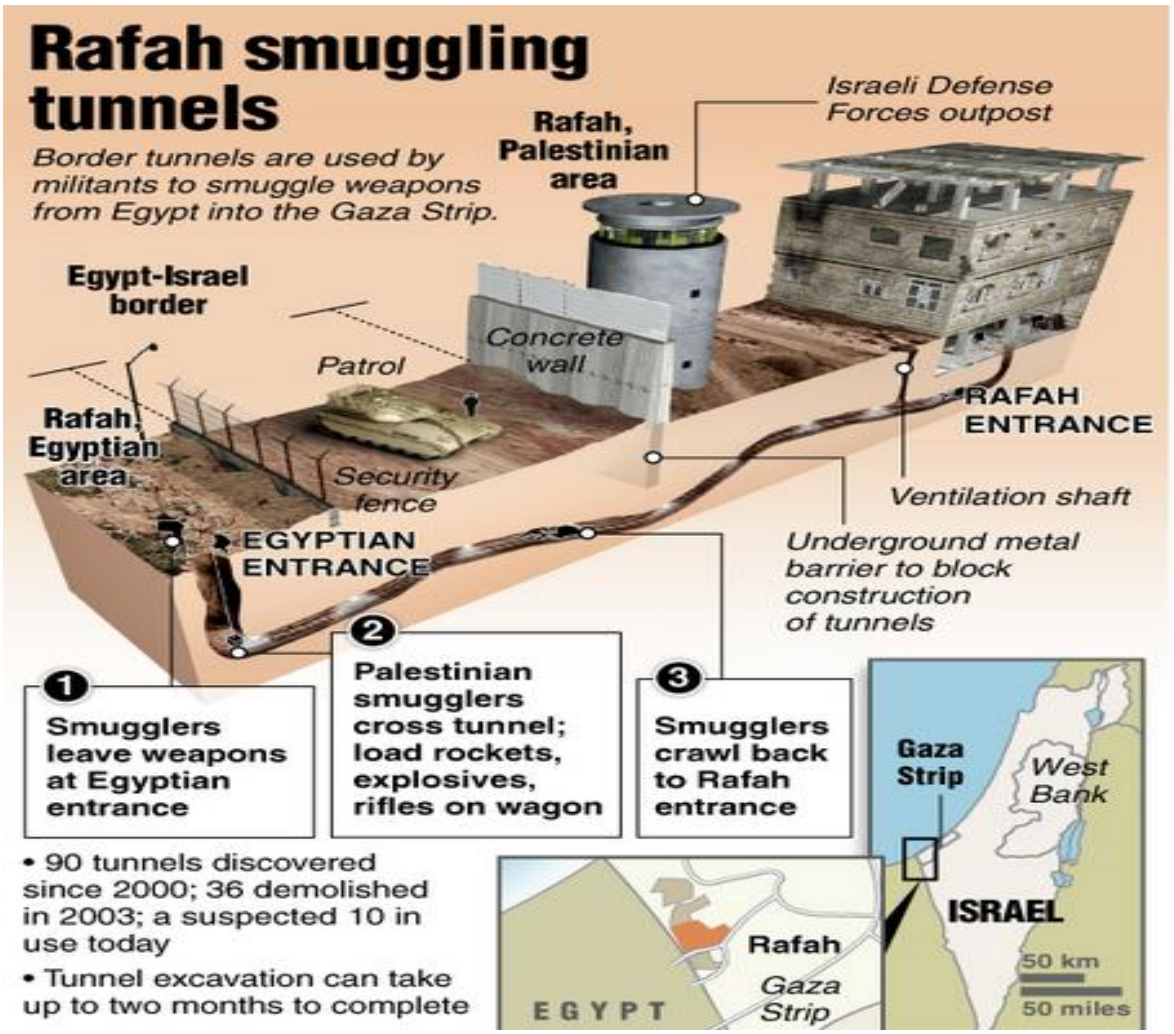


Figure 3.12. Rafah weapon smuggling tunnels, Gaza. *Source: UNRWA, Israel Forces Graphic: MCT Staff.*

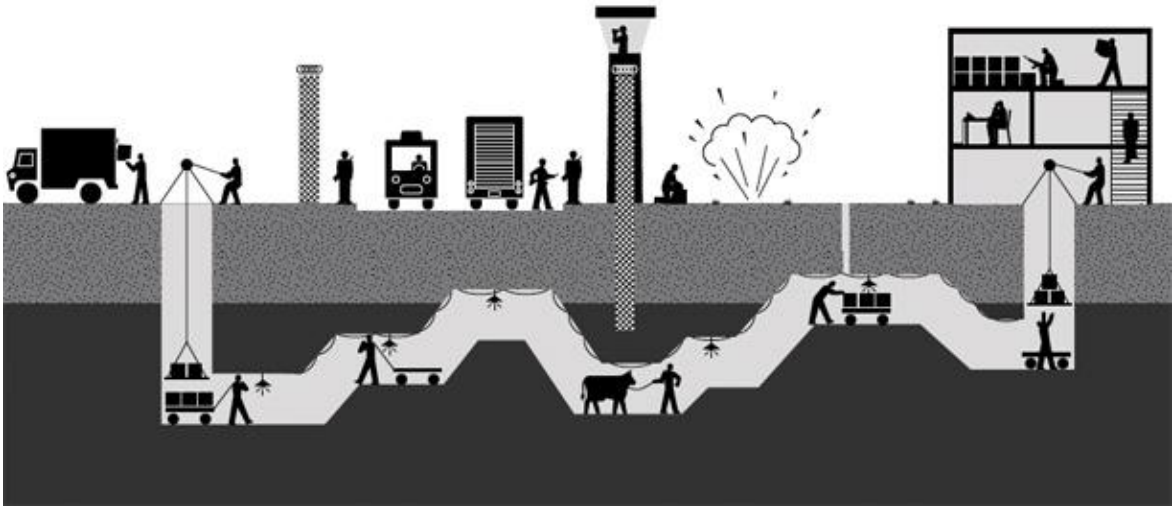


Figure 3.13. Section of Rafah Tunnel. *Source: COLORS*

Figure 3.14. Photo inside Rafah Tunnel. *Source: alakhbar English*

8. ***Principle 8: City at Night***

City at night adds defensible layers for urban form as the level of vision is limited for the air force. Every day, there are two types of conflict between the air force and the city: day conflict and night conflict that begins at sunset where both confronting sides- the air force and the city- start to get ready for it. On the one hand, the air force begins to shift from day tactics into night tactics depending on sophisticated technologies such as infrared surveillance systems that allows for better visibility. On the other hand, the city gradually begins to unveil its hidden defensible weapons, and bare its teeth threateningly against the air force by wearing additional urban form shields.

At night, the urban form shields vary whether the electricity is switched on or off. When electricity is switched on, the excessive reflection and refraction of lights issued

from buildings, streets, public spaces, advertisement sign boards, and vehicles, create visual distortion and chaotic light motion that disturbs and confuses the identification of the tracked human or vehicle (see Figures 3.15 and 3.16). When electricity is switched off, the case during warfare, the darkness demands excessive effort to be done by the air force because it hides pedestrian movements when a person camouflage himself by wearing cloth of color fitting the colors of the context, or by wearing cloth of dark color that does not reflect light, and it hides to a certain extent, several urban form's features (see Figure 3.17).

Figure 3.15. London. *Source: The big picture (2008)*

Figure 3.16. New York City. *Source: Traffic Facebook Covers.*

Figure. 3.17. Beirut. *Source: Moussawi (2012)*

In darkness, the defensible level of urban form varies in accordance with moon phases. The less illuminated moon, the more defensible the urban form in darkness and vise versa (see Figure 3.18). At a full moon, the defensible level of an urban form is at highest level, whereas at a new moon, it is the opposite . At dawn, and in contrast to sunset, the urban form gradually loses its night shields and go back again to the day conflict, to the ongoing series of day- night combats.

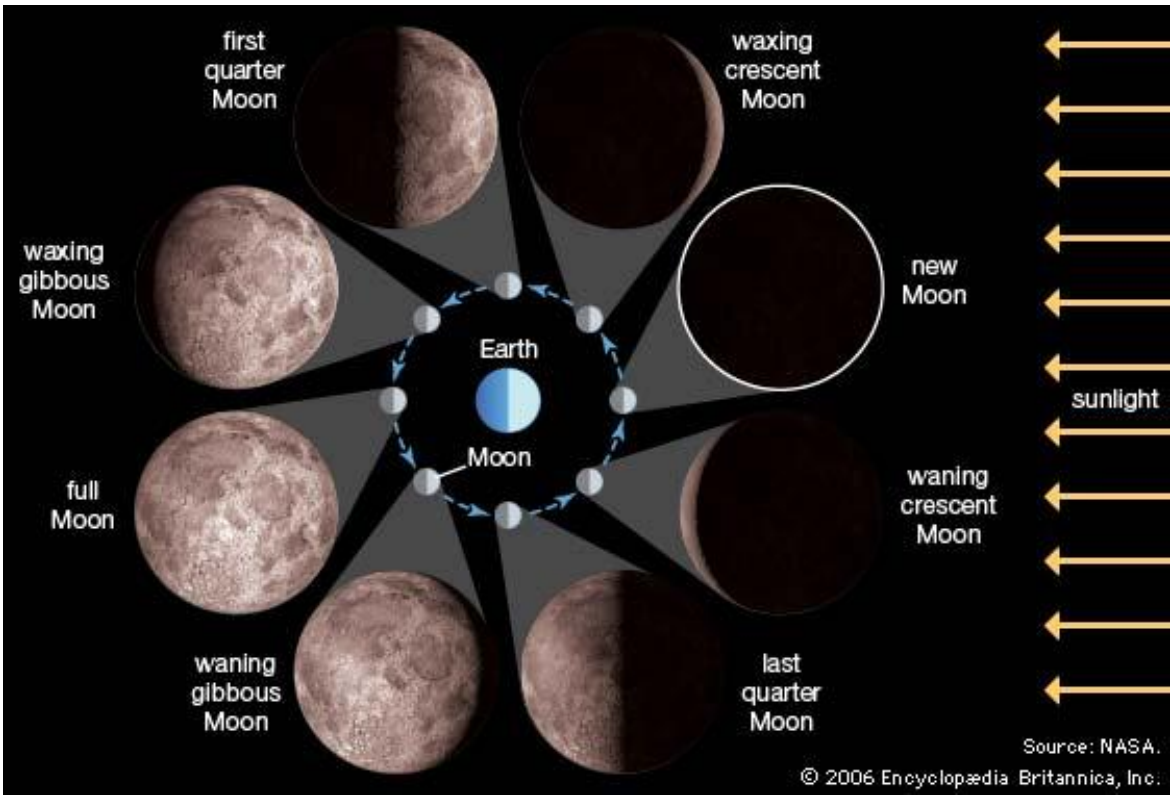


Figure 3.18. Moon Phases. *Source: Encyclopædia Britannica.*

B. Principles Defending the Civilians

1. *Principle 1: Limiting Building Heights*

A decrease in building heights within a certain urban environment leads into a horizontal sprawl of the city as well as a horizontal distribution of inhabitants, which

decreases the number of kills and injuries in case of targeting certain buildings from the air. Slums, rural contexts, and favelas are horizontally distributing their inhabitants (see Figure 3.19). In case of targeted aerial bombardment, they minimize the number of human casualties than would occur in an urban environments of high rise buildings such as Manhattan because the inhabitants of these environments are vertically distributed (see Figure 3.20). In order to decrease the number of injuries then, we can deduce that building heights should be limited (see Figures 3.21 and 3.22). The challenge, however, is to have sufficient space and to minimize the sprawl that would be damaging to the environment.

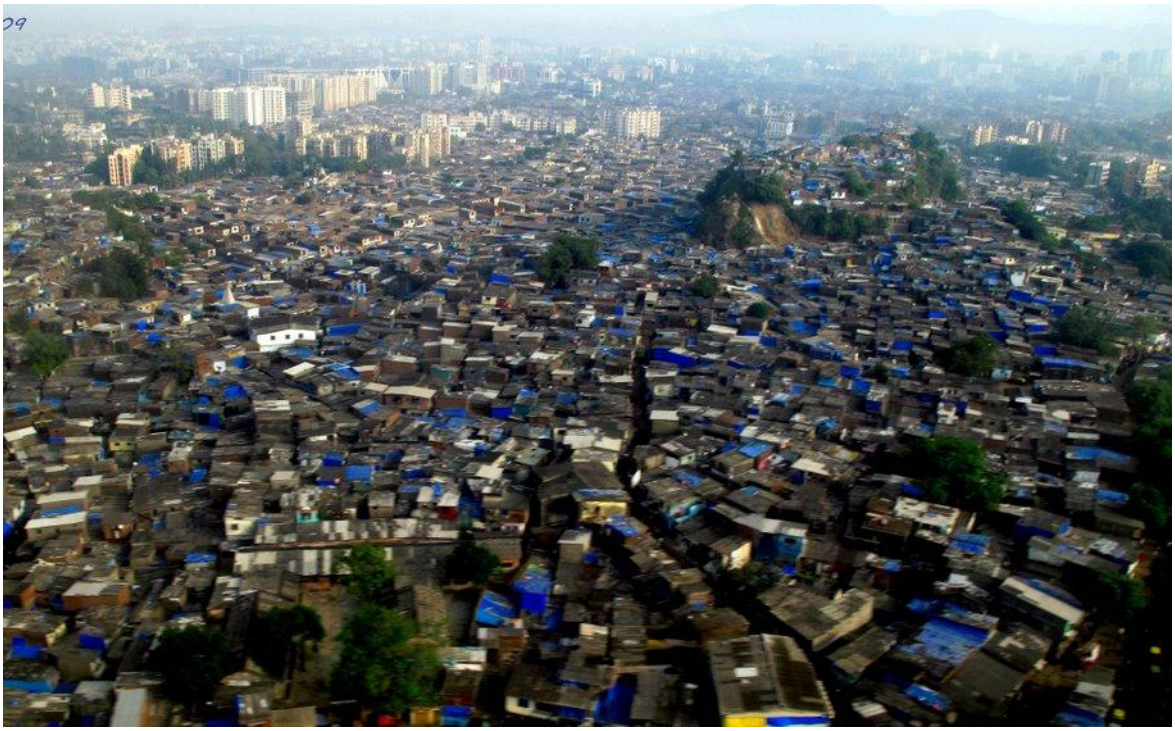
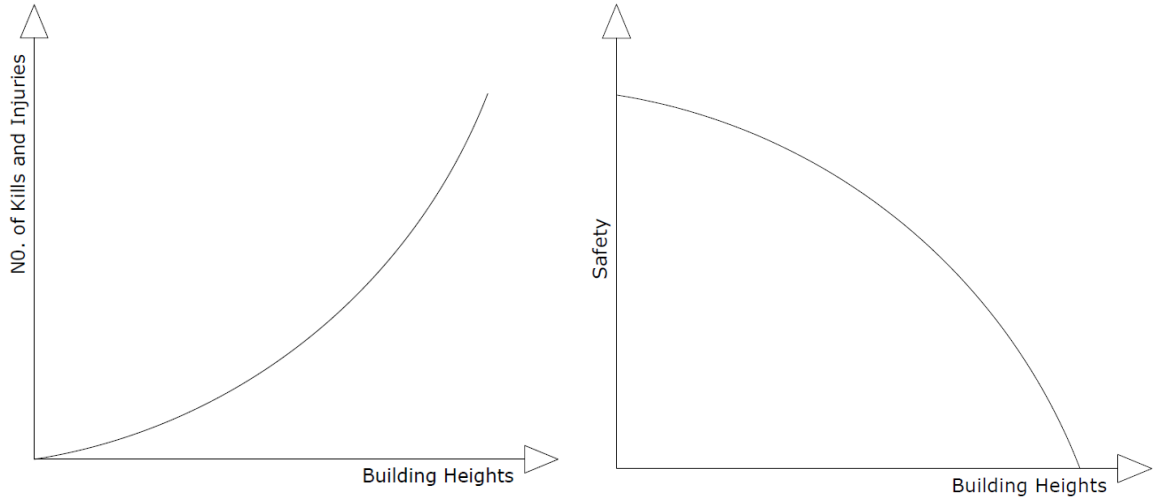


Figure 3.19. Mumbai slums- The horizontal distribution of inhabitants. *Retrieved from: http://www.panoramio.com/photo/29544530*

Figure 3.20. Manhattan- The vertical distribution of inhabitants. *By: NYC Photography.*



Figures 3.21 and 3.22. The relation between safety and building heights. *By: H. Awada (2014)*

2. ***Principle 2: Placing Shelters Underneath Open Spaces and Empty Lots***

Each period's sheltering tactics are related to the available technologies of destruction. In Lebanon, and till summer 2006, it has been widely believed that basements and ground floors are safe places to hide in during warfare. However, summer 2006 warfare has clearly shown how basements were the primary spaces that were being targeted to totally demolish the buildings to kill the hide in inhabitants in the basements within a disturbed evacuation and relief attempts (see Figure 3.23). This warfare was a turning point in technologies of destruction that has been oriented into a much more rigorous and intelligent one that requires on the other side, a turning point in sheltering tactics as the more storeys the building consists, the more dangerous the basement is (see Figure 3.24). So what will be the alternative?

The turning point in sheltering tactics could start from the idea of creating shelters underneath open spaces and empty lots for they are quite less dangerous than building basements while bombing. From a structural point of view, the shelter underneath open space or empty lot will only be covered by one roof slab whose pressure and load is quite less than ten or twelve storeys building. But in a highly dense environment where the existence of green areas and empty lots is negligible, what safe shelters will be then talking about?! Could we propose shelters underneath low rise buildings? Could we talk about shelters underneath streets where vehicular and pedestrian movements are targeted?

Figure 3.23. Demolished Building in Dahyeh in 2006. *By: Raoul Kramer (2006)***.**

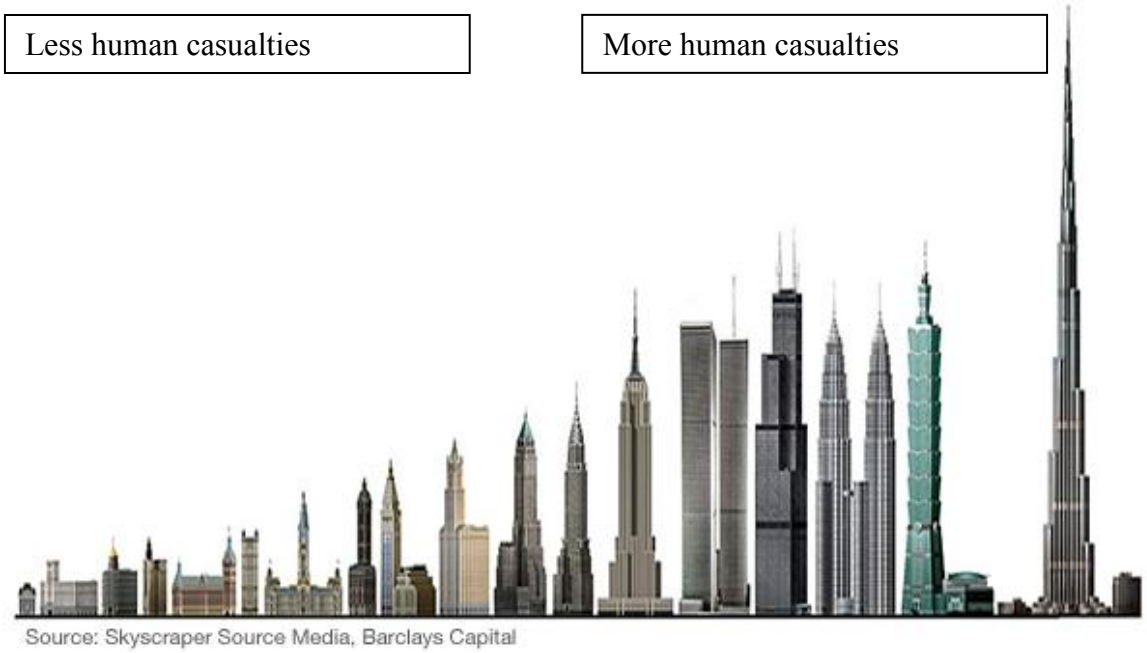


Figure 3.24. Human casualties in relation to building heights. *Source: Skyscraper Source Media, Barclays Capital.*

This chapter has identified strategies for designing a defensible city vis a vis "targeted killings". The above investigated principles of defensible urban form complicate the operations of air force in identifying targets and deciphering movements in the urban form as well as in addressing high limit of human casualties. This complexity imposes additional constraints on the attacking air force that needs to analyze the city space- a time consuming practice. In military sciences, the issue of time is an important factor, it is a factor for victory or defeat because it delays, and sometimes frustrates, the military operations. As a result of the principles of defensible urban form, time factors could prevent the inflammation of warfare and save inhabitants.

Overall, and after examining the ten principles, I can recommend that it is not necessarily to find the principles existing in a certain context altogether to call it defensible. We might see two, three or more principles existing defensively. For instance, we might find compact and chaotic urban form which is not interlocking. And while designing, we might select several principles and manipulate them in a defensible way. This firstly depends on studying the urban constraints of each context to deduce what principles would be more responsive, and depend on the scale of intervention as there are some principles require an intervention on a large scale. Thus, the issue is not about how many principles of defensible urban form there are, but what they are, and how skillfully manipulated they are. Therefore, the urban designer should be selective.

CHAPTER IV

CROSSING DEFENSIBLE URBANISM WITH LIVABILITY

This chapter seeks to outline a strategy for the design of a defensible city. In order to maintain the basic characteristic of "cityness", the defensible city needed nonetheless to maintain a minimal level of livability. The most defensible city needs to be a livable city. In ancient eras such as the walled city, urban forms were designed in a way to provide defense and livability, so what would be the problematic then if we approached the contemporary city from this angle?

In this chapter, I shed light on three of these defensible principles that I confront to the standards of livability in order to balance between on the one hand, the military imperative, on the other the need to maintain city life as noted above. The three principles are as follows:

1. Interlocking urban form- urban jungle
2. Landscape- dense green areas and corridors
3. Shelters underneath open spaces and empty lots

It is easier to measure the basis for making a city livable. The World Health Organization (WHO), and in its public health concern, has comprehensively stated the standards of a livable and healthy place seeking to put the social issue high:

- Compactness: in contrast to urban sprawl that increases risk of physical inactivity, pollution, and alienation, and even increases social costs, the compact form facilitates the promotion of healthy lifestyles such as walkability.

- Ventilation and sunlight: provide a healthy and safe living environment, and ensure any high density environment is well designed to allow better ventilation and sunlight access to the houses.
- Walkability: design walkable neighborhoods to encourage physical activity such as walking and cycling, and provide recreational physical activity such as pedestrian infrastructure and networks of parks.
- Public spaces: Create spaces for community cohesion and interaction such as accessible public spaces and community gardens where people can socialize, meet, play and support group events.
- Green areas: promote the presence of green areas which contribute to better air quality and better physical and mental health; "every city should have a minimum of 9 m2 of green space per person" (WHO).

Every standard mentioned above needs to be developed in relation to local social, cultural and environmental factors.

Hence, the tension between the livable city and the defensible city provides the methodological framework for this chapter. This chapter reveals the defense- livable tension by focusing on the three above mentioned principles of better use in my area of intervention and of better relation to this tension. While attempting to approach the concept of defense through dense, congested, chaotic, labyrinthine, and "jungle"- like urban form, the concept of livability balances the defensible city, looking for green areas, public spaces, better traffic circulation, pedestrian friendly and healthy environment, raising debatable and argumentative tensions: where and how does the concept of livability

oppose the concept of defense? Is it always a confrontation tension? Where does they complement each other? How could the defensible urban form be built in accordance with the concept of livability? How can designers reach a compromise between the two concepts and build a common ground? How could we perceive the urban form then and how would it look like? How could we evaluate it? Taking the tension between defense and livability, this thesis also seeks to operationalize each of the five principles in criteria that we can then measure or scale in ways that can allow us to evaluate a certain urban environment and my intervention in specific.

A. Tension: Interlocking Urban Form

This principle clearly reveals the tension between livability and defense more than any other principle. This tension revolves around three main criteria:

1. Social norms: the interlocking urban form creates spaces hiding each other and diminishing the air force's capabilities to easily see into urban spaces. At the same time, it contributes in creating spaces overlooking at each other. For instance, a bridge might hide a public space but overlooking at the inner spaces of buildings. This could be a problematic in certain contexts for social and religious norms such as the privacy of the residential units and this should be considered.
2. Noisy and quiet spaces: The interlocking urban form facilitates the integration between quiet spaces such as residential units and spaces producing noise such as public spaces and infrastructure. In such integration, a tension emerged questioning how to compromise between what is supposed to be quiet and is not. Hence, the

possibilities are open ended, but I can argue that we have to ensure that spaces which are supposed to be quiet are not negatively impacted by noisy ones.

3. Healthy environment: When urban form is accumulated and amassed vertically, it creates dark spaces and residential units inaccessible by sunlight. For instance, if an elevated infrastructure is preventing daylight access into certain apartments, this would be unlivable. So this tension between livability- (healthy environment) and defense (interlocking urban form) have to be compromised to ensure a healthy environment.

Overall, the flexible criteria of social norms, noisy and quiet spaces, and healthy environment should be manipulated skillfully by the urban designer to balance between livability and defense.

1. *Case Study: A Critical Overview*

In this section I will shed light on "Habitat 67" project in Montreal to criticize it from defensible and livable angles. Although Moshe Safdie has not intended to include the concept of defense, the project provides interesting insights to the investigation of the livable/ defense tension.

Fig. 4.1. Sketch of "Habitat 67" by Moshe Safdie. *Retrieved by: http://www.dunnedwards.com/SpecsSpaces/blogEntry.aspx?entryId=419.*

Moshe Safdie's re-imagined the dense urban environment of twelve storeys heigh buildings through the social integration and complex solid-void relationships (see Figure 4.2). The actual housing area consists of 258 precast housing unit in 20 types put together within modular construction units. The apartments were shaped in the form of three pyramids connected through vertical and horizontal circulations. From a defensible angle, the project appears to be adopting a complex and integrated urban form that reflects a variety of shady spaces and mazy patterns. From a perspective of livability, Moshe Safdie has addressed health concerns by securing sunlight to all units. The designer also considered quiet/ noisy spaces by placing the pedestrian network in a distance back to the residential units (see Figure 4.3). Safdie has however, overlooked privacy concerns since spaces and terraces do not provide sufficient privacy, conflicting with communities where privacy and safety issues are priorities. Thus, although the urban form is defensive and responds to several criteria of livability, it fails to respond to privacy concerns that would be imperative in religiously observant communities such as in Haret Hreik.

Figure 4.2. Aerial view. *By: Graetz Studio*.

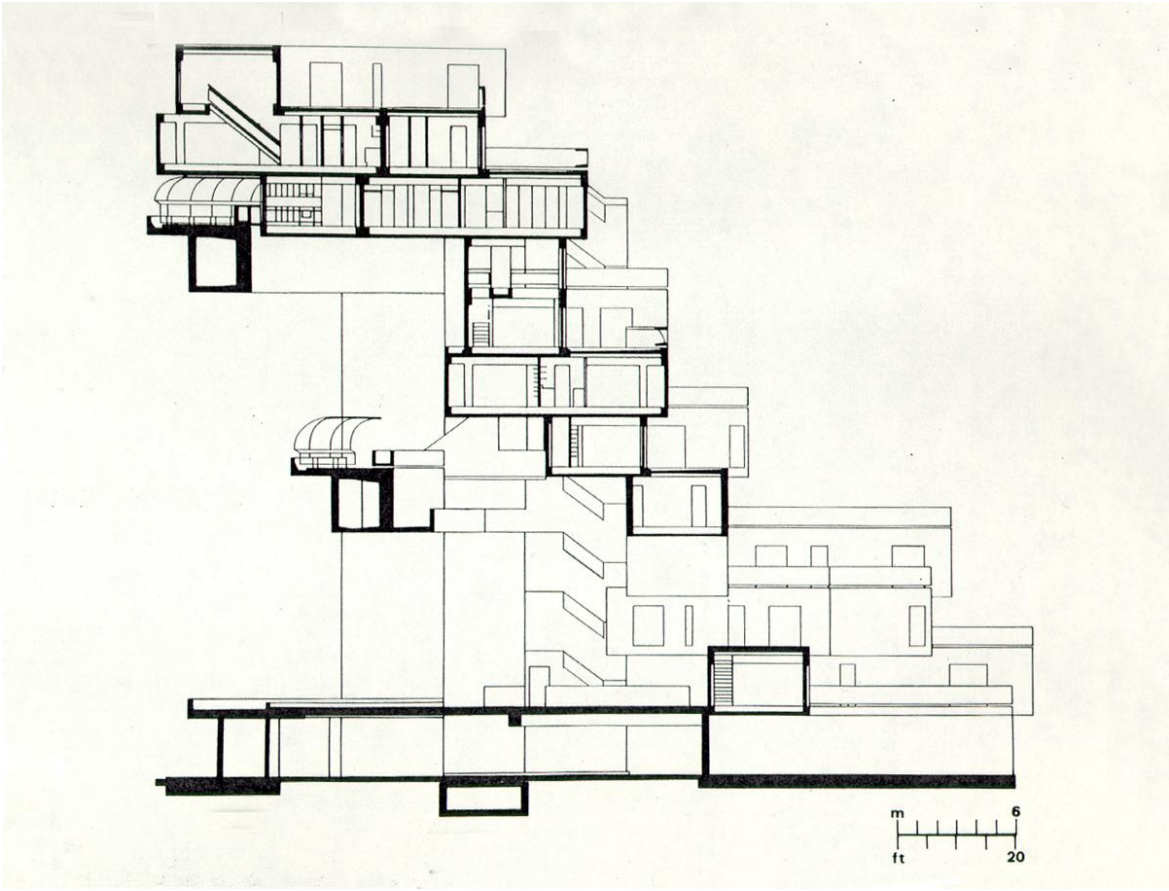


Figure 4.3. Section. *Retrieved by: http://arch1101-2010kjb.blogspot.com/2010/04/moshe-safdie-habitat-67-montreal-canada.html.*

B. Compromise: Landscape- Dense Green Areas and Corridors

In this section I focus on the principle of "landscape- dense green areas and corridors" where the greener an area and the more open spaces are provided, the more defensible the urban space will be. In this case, exaggeration is encouraged.

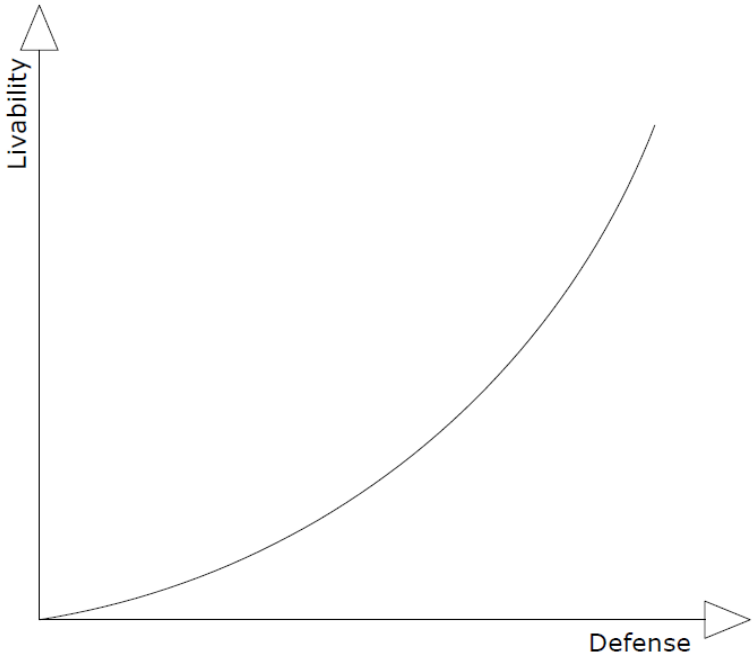


Figure 4.4. Defense in relation to the concept of livability. *By: H. Awada (2014).*

Green areas and corridors have defensible capabilities. But before moving on, I briefly review their livable characteristics. Green areas:

- Provide better air quality.
- Offer green views for buildings.
- Create recreational and social spaces within the highly dense environment.
- Provide better impression of the space.

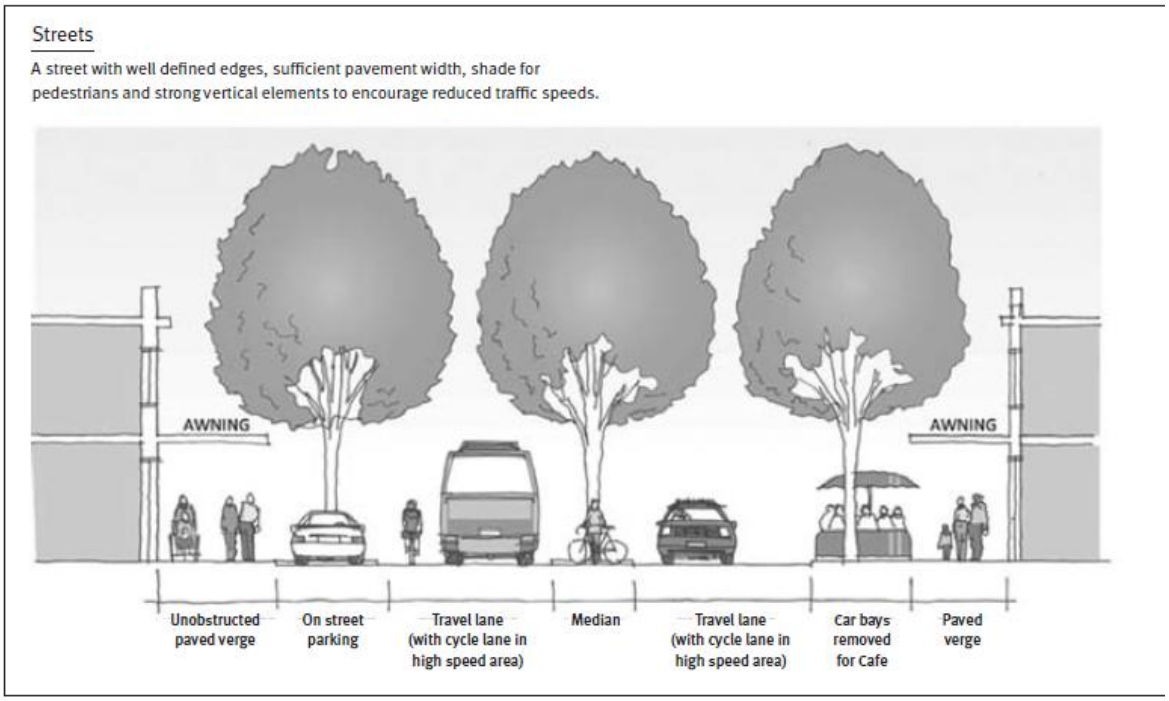
The defensible capability of green areas is associated with proposing more spaces for public domain wherever possible in order to provide more green lakes and corridors connected within the city. But what if the city is extremely dense, and empty lots are totally absent?

Regarding the methods of operationalization, there are two criteria related to the defensible strategy of the tree itself, and to the defensible greening strategy of streets.

- The Defensible strategy of trees:
    1. Select evergreen to maintain the continuity of covering up pedestrians and vehicles despite seasonal variations.
    2. Select dense-leaves trees to prevent visual accessibility from air into the space of the street, thus, the visual insulation will be high.
    3. Tree leaves should be large to disturb the vertical communication of electromagnetic waves between the space of the street underneath the trees and the air space over it.
- The defensible strategy of streets (see Figure 2.5):
    1. The trees should be interlocking to hide the vehicular and pedestrian movements, the entrances of buildings, and the underground entrances and exits.
    2. The greening strategy of the street should take into consideration the width of the street to choose the appropriate trees' diameter to cover up the street; the process in this case is flexible whether to choose variety in width dimensions or to unify them.
    3. The greening strategy could implant either one or two rows of trees; the strategy is elastic for the most important is to ensure the coverage of the street.

4. The upper of the tree (limb: the green part) should be at least 5.5 meters higher than the street level to keep on the visual connection between vehicles, pedestrians, and shops' facades, on the ground and mezzanine levels.

Figure 5: A streetscape that promotes walking and cycling



Source: Healthy Spaces and Places, www.healthyplaces.org.au

Figure 4.5. The defensible strategy of a street. *Source: Healthy Spaces and Places, www.healthyplaces.org.au.*

1. *Case Study 1: The Rua Goncalo de Carvalho Street*

The Rua Goncalo de Carvalho street in Porto Alegre supports the above mentioned argument and penetrates the dense physical fabric like a green river where trees flanks either sides of the street (see Figures 2.6.and 2.7).

Figure 4.6. The Rua Goncalo de Carvalho street- Top View. *Retrieved from:* http://www.ekokuce.com/vesti/zanimljivosti/najlepsa-ulica-na-svetu-se-nalazi-u-brazilu

Figure 4.7. The Rua Goncalo de Carvalho street- Street Shot. *Retrieved from:* http://www.ekokuce.com/vesti/zanimljivosti/najlepsa-ulica-na-svetu-se-nalazi-u-brazilu

2. *Case Study 2*: *Landscape Corridors*

The vision of the "Landscape Corridors" project started with the concept of landscape corridors that act like a virus that grows little by little in the city by transforming the grey into green. These corridors cross the city and connect with different green spaces. Sauvabelin hill is the areas where the corridor starts to then link the lake Ouchy. What is interesting in this project is that it creates green corridors and areas within the highly dense urban environment by elevating the greenery on a specific system. So, in the absence of empty lots and public spaces, greenery could still penetrate the urban form and provide defense (see Figures 4.8- 4.18).

Figure 4.8. Landscape Corridors. *Source: Organicities (2011).*

Figure 4.9. Landscape Corridors. *Source: Organicities (2011).*

Figure 4.10. Landscape Corridors. *Source: Organicities (2011).*

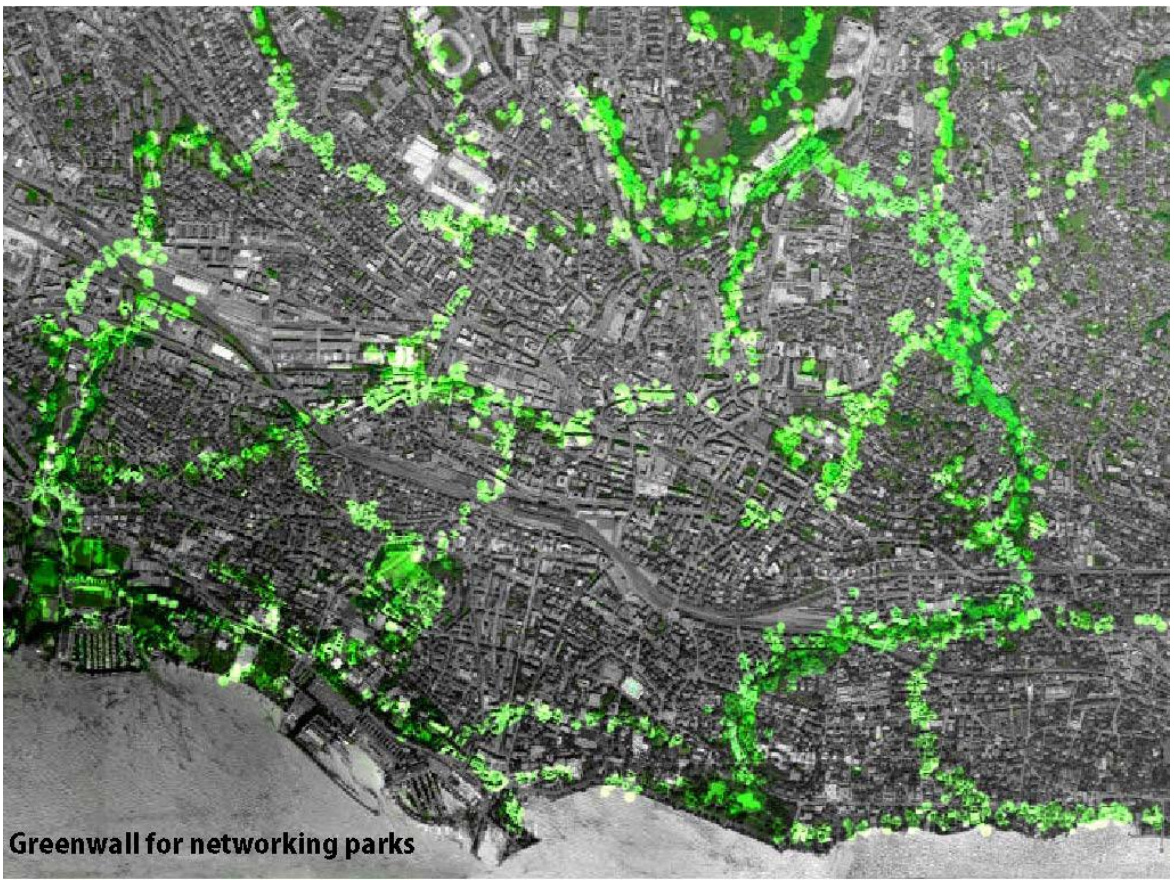


Figure 4.11. Landscape Corridors. *Source: Organicities (2011).*

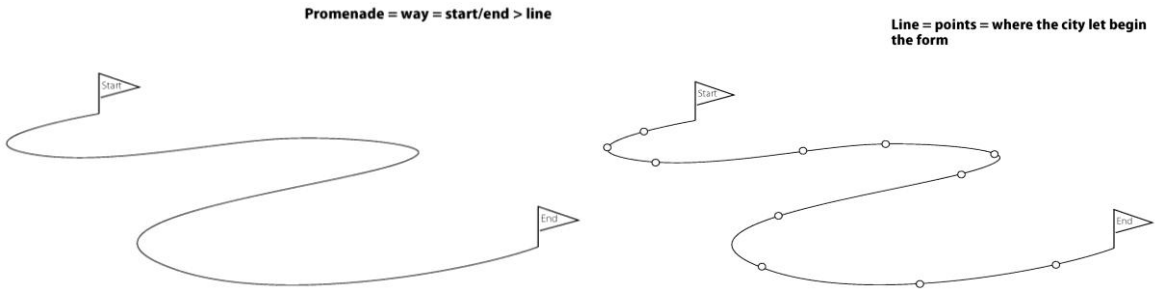


Figure 4.12. Landscape Corridors. *Source: Organicities (2011).*

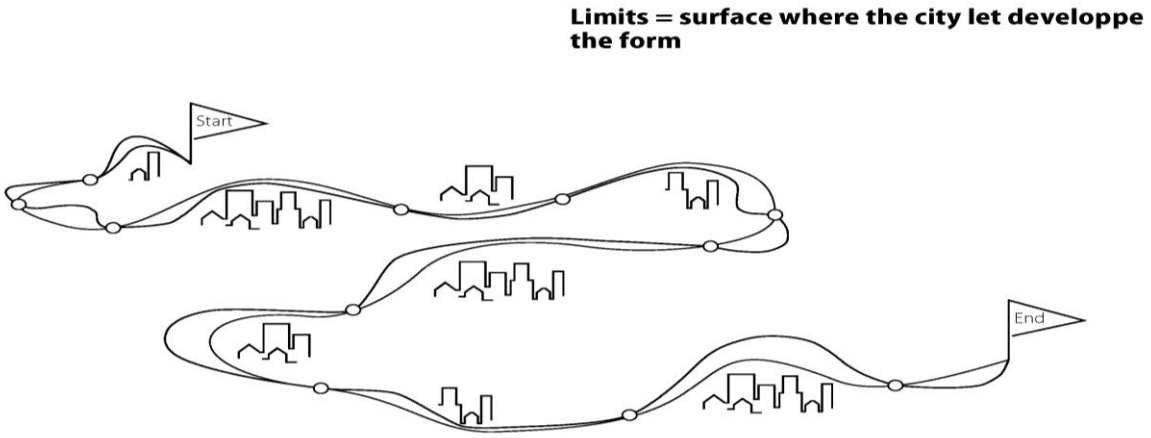


Figure 4.13. Landscape Corridors. *Source: Organicities (2011).*

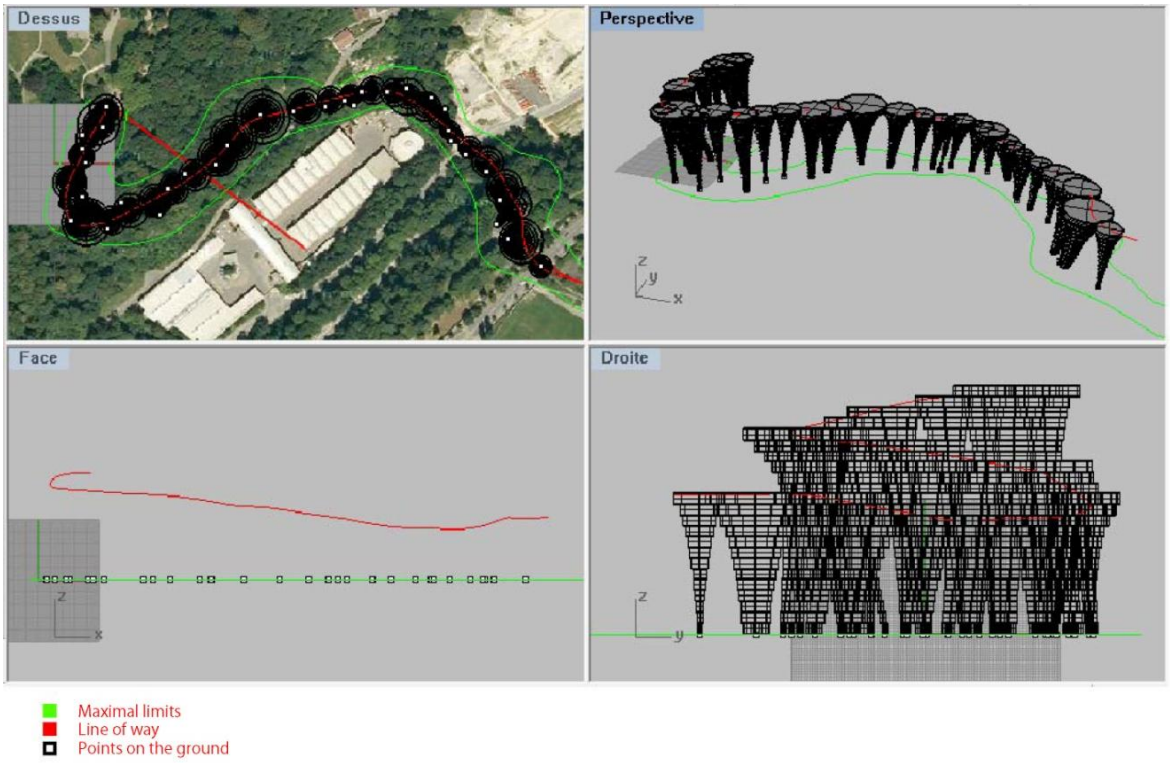


Figure 4.14. Landscape Corridors. *Source: Organicities (2011).*

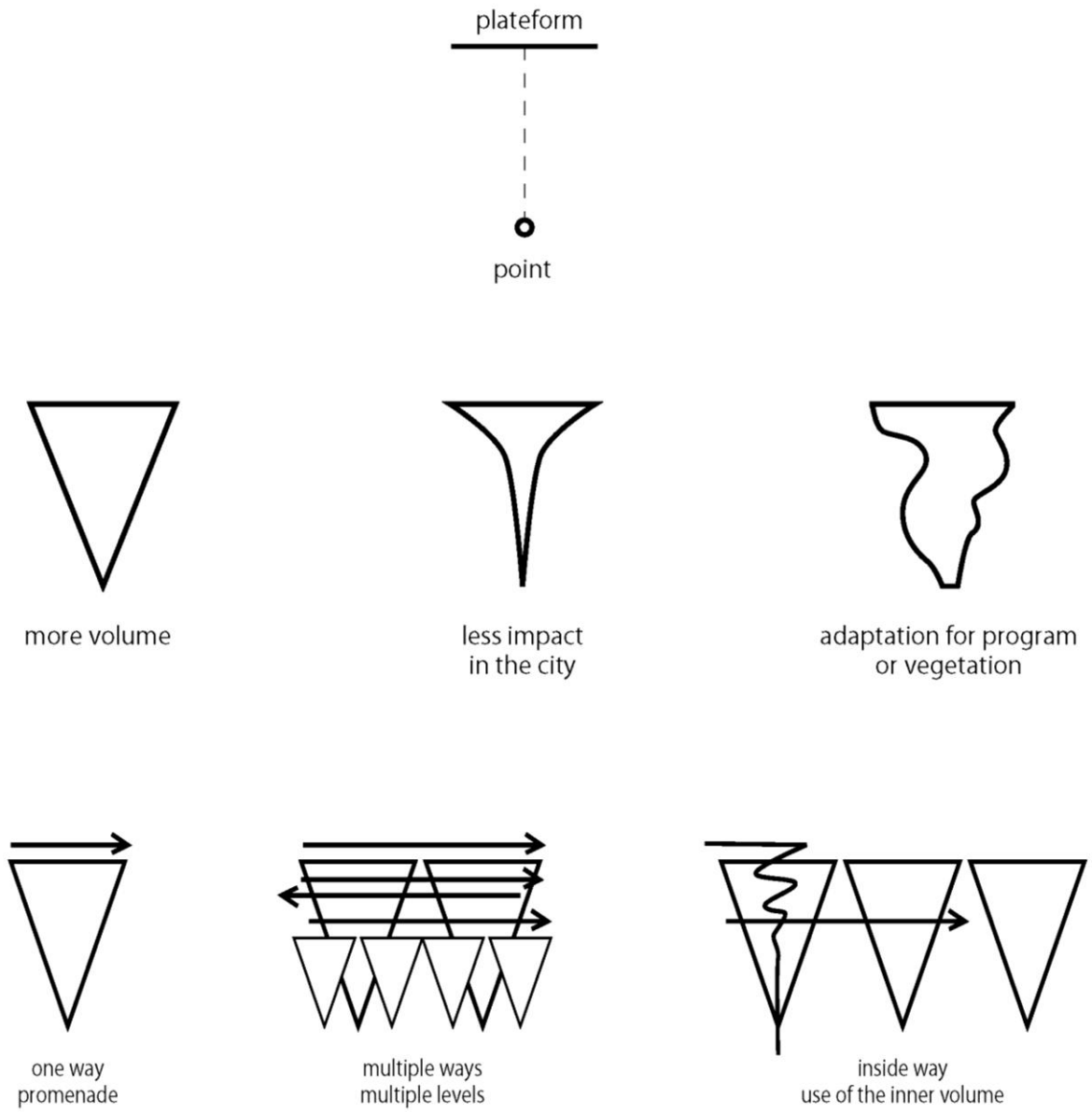


Figure 4.15. Landscape Corridors. *Source: Organicities (2011).*

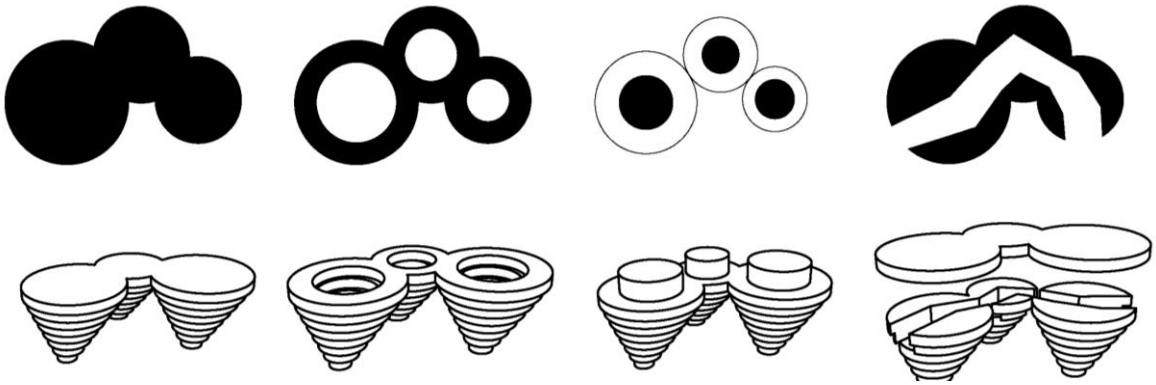


Figure 4.16. Landscape Corridors. *Source: Organicities (2011).*

Figure 4.17. Landscape Corridors. *Source: Organicities (2011).*

Figure 4.18. Landscape Corridors. *Source: Organicities (2011).*

3. ***Case Study 3: The Beirut Wonder Forest***

Designed by Studio Invisible, "The Beirut Wonder Forest" is an excellent example that reveals the defensible qualifications of seasonal variation, and solves at the same a livable problematic which is the large superiority of transportation and concrete of city high-rises, over public green spaces. This negatively impacts Beirut's air quality, and the availability of new green spaces (Webster, 2010).

For this reason, Studio Invisible aimed to transform the Lebanese capital into a green city by planting trees on its rooftops; the plan fill with greenery and serenity, the urban

bulks (see Figures 4.19 and 4.20). The proposal asks to implement simple rooftop gardens on many of Beirut's high-rises, if not all (Studio Invisible, 2011) (see Figures 4.21). The proposal is livable on several levels:

- Rainwater filtration (see Figures 4.22).
- Improving air quality by reducing air pollution.
- Providing beautiful places for relaxation, and better sense of environment (see Figure 4.23).
- The trees provide shadows and cool on the city, which reduces energy consumption.
- The green roofs could also be used to raise fruit and vegetables, providing the city with a source of locally grown produce.
- The solution is simple, not costly, and does not disrupt the on urban transportation in Beirut.

Moreover, elevated green roofs add an extra layer of urban camouflage from the top view and provide shadows and movement underneath them which are reflected in "The Beirut Wonder Forest". The seasonal variation creates variety of textures, colors and shadows such as green, brown, grey and the colors of the top roof slabs, which disturb the military centers of air force while comparing the aerial maps from one time to another to follow up any variation in the urban context. Furthermore, the exploitation of natural elements in an urban context contributes in adding an extra layer of disturbance and complexity for the air forces as they have to deal will double layered environment depicting rural and urban challenges.

Figure 4.19. The Beirut Wonder Forest. *Source: Webster (2010).*

Figure 4.20. The Beirut Wonder Forest. *Source: Webster (2010).*

Figure 4.21. The Beirut Wonder Forest- Simple rooftop gardens. *Source: Webster (2010).*

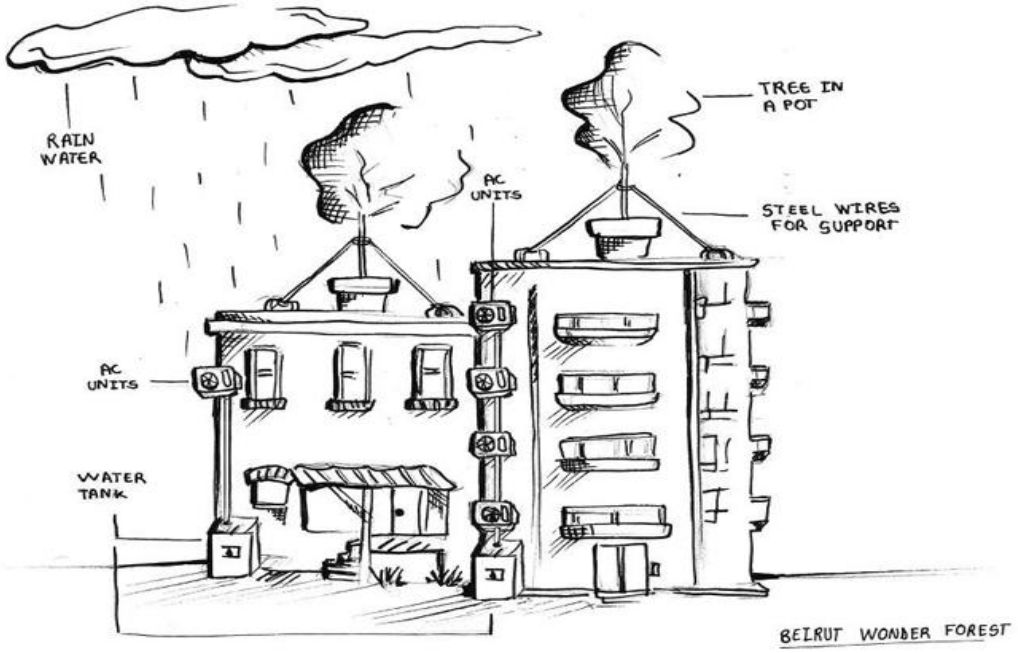


Figure 4.22. The Beirut Wonder Forest- Rainwater filtration. *Source: Webster (2010)*.

Figure 4.23. The Beirut Wonder Forest- Rainwater filtration. *Source: Webster (2010)*.

C. *Compromise: Shelters Underneath Open Spaces and Empty Lots*

This principle is dependent on the previous one as proposing shelters underneath open spaces requests the presence of open spaces. Otherwise, the safety and livable targets of shelters could not be achieved. So we can argue that the existence shelters (safety) is associated with proposing more spaces for the public domain wherever possible. In this principle, we can argue that safety and livability totally compromise each other and go along with each other with no tension.

There are four methods of perationalization (see Figure 4.24):

- Wherever possible, shelters should be built underneath empty plots and greened open spaces because this will increase the number of shelters within the city.
- Shelters should as much as possible be far from each other and be distributed within the blocks in the form of smaller shelters instead of one or two major ones. Because in case of targeting one smaller shelter, the majority of the hide in inhabitants will not be in danger whereas it is the opposite in case of targeting one or two basic shelters.
- Shelters should be far from the surrounding buildings by at least 8 meters distance (the radius of danger while the building is falling down to the ground), to avoid the danger the falling buildings might cause to the shelter.

Figure 4.24. Section of a shelter underneath a greened open space. *By: H. Awada (2014).*

Without any doubt, this chapter has assured that defense and livability could be merged and brought to mind while thinking of the city and while approaching it. This tension has raised several problematiques and brought new ones to the surface as the topic is original and has not been investigated before in the contemporary era, the era of urban warfare. Now, I will apply on my area of intervention in the area of Haret Hreik the three principles investigated in this chapter in addition to two other principles that do not contradict with the concept of livability and which are more responsive to it in my intervention area.

CHAPTER V

URBAN DESIGN EXPLORATIONS

A. Problematic Context: Haret Hreik (South Beirut- Dahyeh)

Figure 5.1. The densely populated environment of Dayheh. *Retrieved from: http://forum.skyscraperpage.com/archive/index.php/t-205991.html***.**

The Middle East is confronting various military threats which drive countries into more warfare urbanism than a peaceful one. The global conflict, best presented in US and Western Military power vis-a-vis dense urban terrains of the global south, also applies on the confrontation between Israel and Hizbollah. Israel possesses the developed military power attempting to unveil and dominate Hezbollah's areas and territories, and more specifically the highly dense environments.

Dahyeh is a densely populated environment (see Figure 5.1), but this is not the only reason that urged me to take it as case study for experimenting the principles of defensible urban form in relation to the concept of livability:

1. *The Bombing of Dahyeh*

In July 2006 warfare, the Israeli air force repeatedly raided the Southern Suburb of Beirut "Dahyeh", targeting the commercial and residential zones as well as Hezbollah's infrastructure. All neighborhoods in Dahyeh were hit by the vertical power, but the most significant destruction took place in Haret Hreik, the security and strategic quarter of the Party. In the first days of the conflict, The Israeli air force raided on Dahyeh in targeted areas. Three weeks later, a process of total demolition of particular neighborhoods took place specifically Haret Hreik. "Within a one-square-kilometer area, it destroyed an estimated 260 multi-story apartment buildings and severely damaged hundreds of others. 3,119 housing units and 1,610 commercial units were demolished and 20,000 residents lost their homes. Ten to twelve-story apartment buildings were turned into craters, infrastructure networks were annihilated, and street boundaries became unidentifiable" (Fawaz, 2011, p. 1) (see Figures 5.2 and 5.3).

Figure 5.2. Dayheh after aerial bombing . *Retrieved from: http://www.tarmeem.org.lb/datapages/wa3ed/dahye2.htm*

Figure 5.3. Haret Hreik before and after Aerial Destruction. *Source: Associated Press, Geoeye (2006).*

2. *The Reconstruction of Dahyeh*

Dahyeh has experienced a reconstruction process worth looking into from the angle of intervening in the highly demolished zones to test the principles of defensible urban form. In November 2006, Sayyed Hassan Nasrallah, the secretary general of Hizbollah, reassured that Dahyeh will be rebuilt "more beautiful than it was." This phrase was translated through the Wa'd (the promise) project into urban design goals and objectives: conservation of the physical in order to conserve the social fabric, within two years reconstruction period. In July 14, 2012, Hizbollah celebrated their second victory "the reconstruction of Dahyeh." However, Wa'd did not take into consideration the hypothesis of designing a defensible urban form despite the fact that it would be of extreme interest for both Hizbollah and civilians.

3. *Dahyeh: A Site for Threat Exchange*

Dahyeh is a space charged with military meanings where threats between Hizbollah and Israel are being exchanged. Dahyeh came to boast a powerful body politic and how this body politic responds to the Israeli assaults (Fawaz 2007). During the 2006 war, Sayyed Hassan Nasrallah threatened: "If you bomb Dahyeh, we will bomb Haifa," practicing psychological warfare on Israel. Nowadays, this urban "citadel" is being used as a tool for more national and regional strategic military purposes. In July 14, 2012, the ceremony of the reconstruction of al-Dahyeh, Sayyed Hassan Nasrallah threatened: "If you bomb Dahyeh, we will bomb Tel Aviv". He clarified the stance, adding, "Maybe they thought that if they bomb buildings in Dahyeh, we will make a few holes in the walls of

Tel Aviv." Sayyed Nasrallah then detailed the new terms of war, saying "Today I would like to tell them: No. If you destroy one building in Dahyeh, we will destroy [many] buildings in Tel Aviv." The walls and the buildings of Dahyeh and Tel Aviv have become the main keywords that define the warfare, the criteria for expecting the kind and the level of the warfare scenarios, strategies, tactics and destruction, and the perspective through which predicting and imagining the destiny of the Middle East region could be possible.

4. *Dahyeh and the Probable Israeli Warfare Scenarios*

Take my assessment of the destruction from above, Dahyeh's urban form might confront two probable warfare scenarios specific to asymmetric warfare in densely populated areas. The first scenario is the total demolition of Dahyeh either through concentrated aerial raids or through a long period warfare. The second scenario is the "targeted killings" or "smart destruction", which is an attack usually without prior warning, which intends address specific targets in the city with no or minimal collateral damage to surrounding structures, vehicles, and buildings. This scenario is the one that my thesis builds its assessment on as stated in the previous chapters.

B. An Alternative for Defensible Reconstruction

The military methods of dealing with a city are thus similar to those of a planner. If in the last century military planning dealt with the organisation of the city and its physical fabric, today's planning is more complex; military personnel seek to learn how the cities work so that they may control them by manipulating their various components. (Misselwitz & Weizman, 2003, 7)

Each new city will create a different pool of resources and thereby create different urban threats. (DIRC, 1997, 8).

Taking my assessment of "targeted killings" as being the tool of destruction against the dense urban form of Dahyeh, my alternative tries to apply on Haret Hreik, the principles of defensible urban form in relation to the concept of livability. As DIRC (1997) argues, my area of intervention could be a different pool of sources and create different urban threats against the air force power.

In this section, I will state my vision, analyze the selected blocks of severe demolitions, discuss their defensible weaknesses, and then propose an alternative for reconstruction by going over each principle of defensible urban form mentioned in my vision, and illustrate it through maps and evaluate it qualifications. At the end, I will come up with a comprehensive urban design scenario.

1. *Vision*

My vision is about designing a defensible and livable urban form that deals rationally and harmoniously with the fiveprinciples I have selected in the conclusion of the previous chapter:

1. Interlocking Urban Form- Urban Jungle
2. Landscape- Dense Green Areas and Corridors
3. Shelters Underneath Open Spaces and Empty Lots
4. Attached Buildings- Unidentified Building Outlines from the Top
5. Underground Tunnels

Although the principles of defensible urban form could be investigated and recognized, the method of how to deal with them while designing is flexible. This refers to the fact that each zone has its own physical morphology and urban constraints that directly impact the vision. Thus, my vision will first depend on studying the urban constraints of the intervention area in terms of its defensible weaknesses generated from the Wa'd approach to reconstruction. Then, my vision attempts to initiate from those defensible weaknesses to change them into points of strengths by illustrating to the principles of defensible urban form and mapping them.

2. *Site Analysis*

Figure 5.4. Context 1: Haret Hreik in Beirut. *Source: Fawaz and Ghandour (2007)*

Figure 5.5. Context 2: Intervention area in Haret Hreik. *Source: Fawaz and Ghandour (2007).*

Figure 5.6. Context 3: Evaluation of building conditions after summer 2006. *Source: Fawaz and Ghandour (2007).*

Figure 5.7. Analysis 1: Reconstruction Strategies of Intervention Area (1/1000)**.** *Source: Fawaz and Ghandour (2007).*

Figure 5.8. Analysis 2: Building Heights (1/1000). *Source: Fawaz and Ghandour (2007).*

Figure 5.9. Analysis 3: Land Use (1/1000). *Source: Fawaz and Ghandour (2007).*

Figure 5.10. Analysis 4: Apartment Areas (1/1000). *Source: Fawaz and Ghandour (2007).*

3. *Defensible Weaknesses of the Intervention Area*

In order to apply the principles of defensible urban form on the selected blocks, it is necessary to shed light on the existing defensible weaknesses. This refers to the fact that once those urban form weaknesses are recognizable, the main keys of change into strengths become identifiable. Moreover, "the urbanization of the selected blocks occurred during the 1970s and 1980s" (Fawaz & Ghandour, 2007) with almost no considerations for the Lebanese urban codes and regulations. In relation to the selected defensible principles

mentioned in my vision, the defensible weaknesses of the existing urban fabric are as follows (see Figures 5.11):

1. The interlocking of urban form is negligible: which produces freestanding buildings due to the individual property of plots which prevents the integration of buildings or the creation of public network that integrate within the urban form.
2. Identified building outlines from the top: due to the production of free standing buildings, the outline of each building is easily identifiable from the sky.
3. The underground passageways are absent: for instance, there is no underground linkages that connect the blocks.
4. No presence of safe shelters: it seems that in any foreseeable warfare, basements would be again used as shelters which are not safe at all as discussed before in chapter III.
5. The streets and open spaces are visible from the sky: due to the absence of integrated buildings, green streets and green spaces, the movement of vehicles and pedestrians is visible from sky.

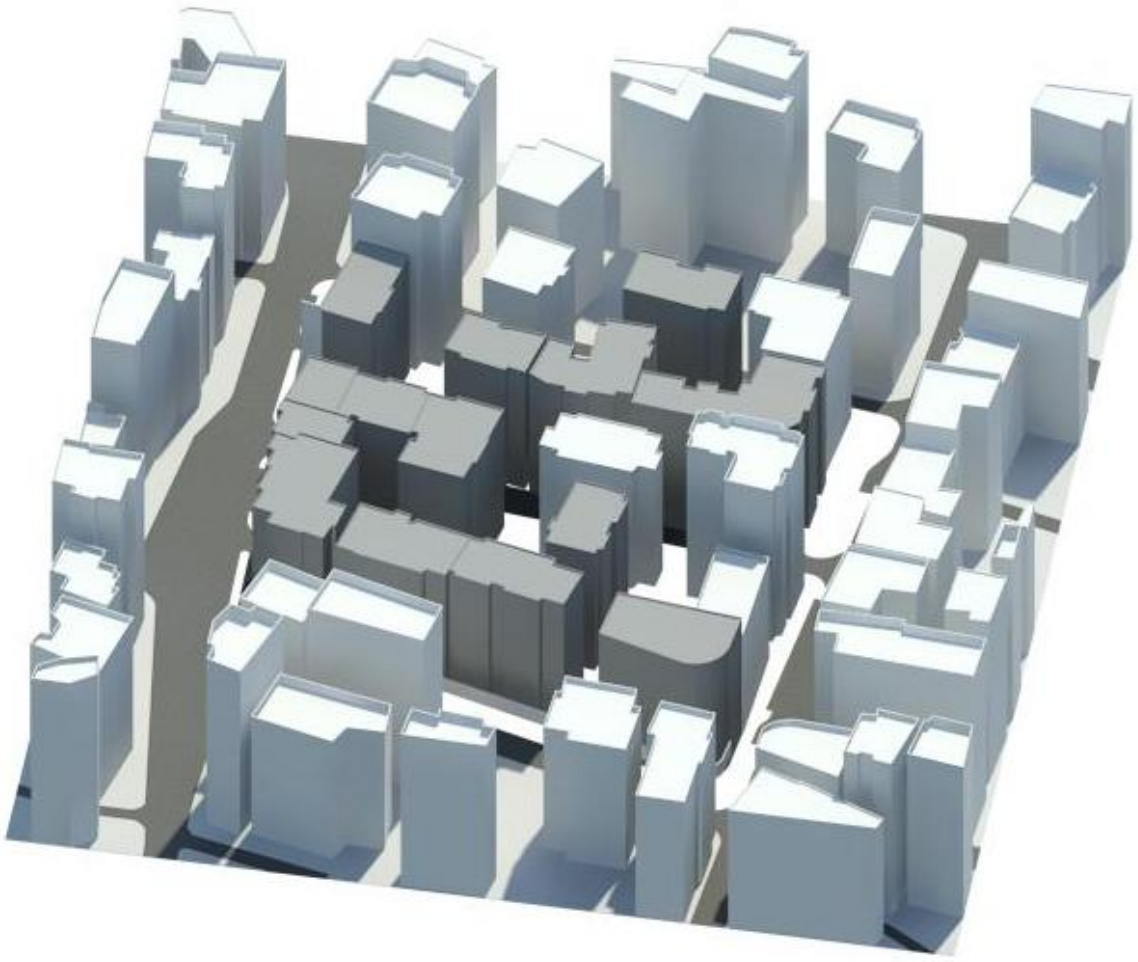


Figure 5.11. Existing urban form. *By: H. Awada (2014).*

4. ***Mapping the Principles of Defensible Urban Form***

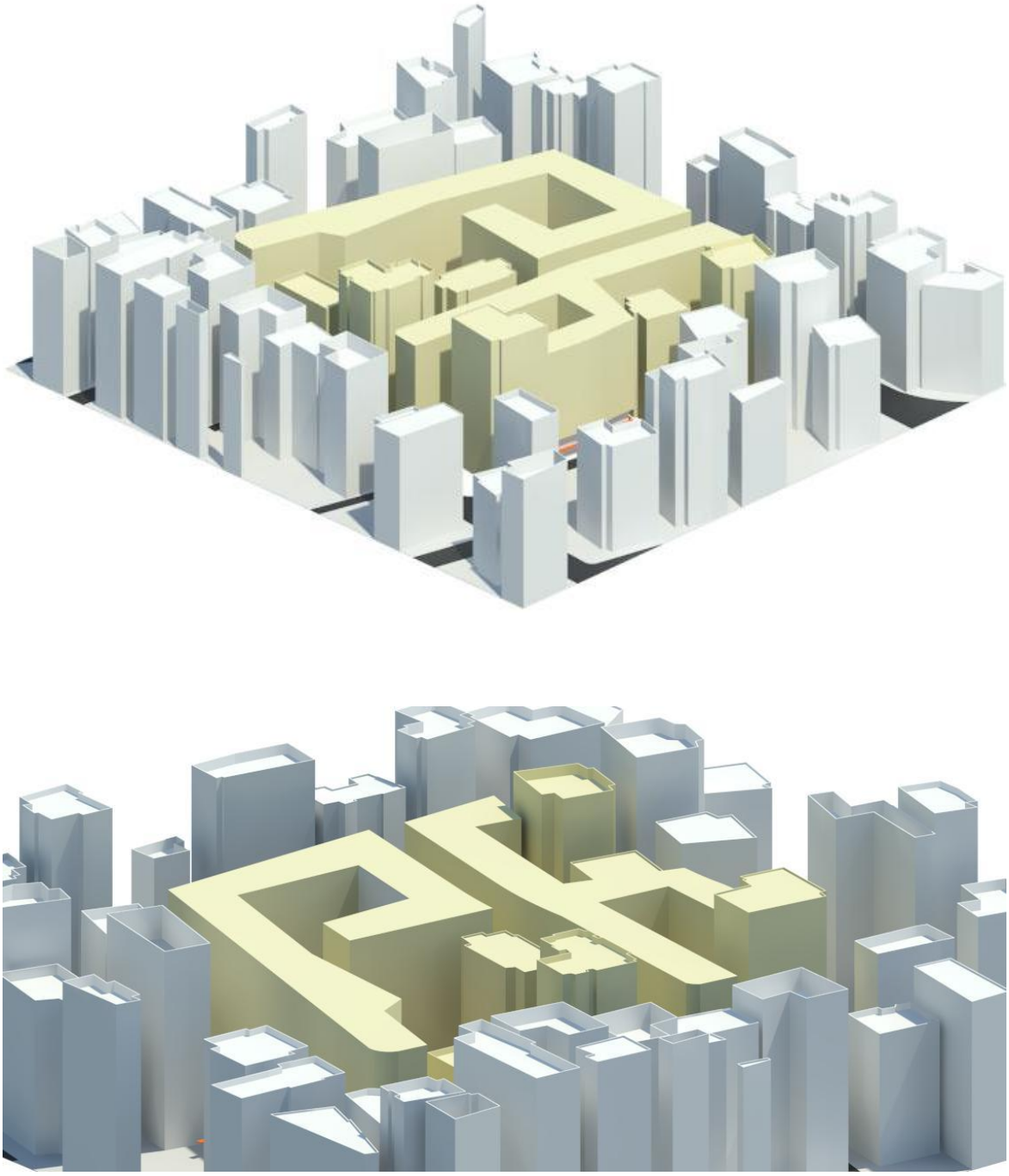
My proposal deal with four urban elements that represent the primary tools: buildings- with the buildings to be demolished only- (representing the private development), streets (representing the infrastructure), public spaces, and landscape.

My alternative for reconstruction started with the idea of attaching the freestanding buildings to camouflage the outline of the top roof and to create internal open spaces

distributed within the blocks (see Figures 5.12- 5.15). There were already two attached clusters and I joined with them the freestanding buildings to compose the proposed physical fabric which takes into consideration several social and livable requirements. First, it conserves the original number of apartments and areas to conserve the social fabric who are the dwellers of the demolished buildings as it was prior to the summer of 2006. Second, the proposed design keeps the same number of floors (9-11 storeys) and do not intend to decrease them; this is in order to facilitate the creation of green spaces and non built areas within the blocks necessary for providing shelters underneath them, and in order to improve the level of livability of the zone such as better sunlight and ventilation.

Figure 5.12. Intervention: Attached Buildings/ The Proposed Urban Fabric in Relation to the Existing one (1/1000). *By: H. Awada (2014).*

Figure 5.13. Intervention: Attached Buildings/ Plan at Street Level (1/1000). *By: H. Awada (2014).*



Figures 5.14 and 5.15. Intervention: 3D Shots. *By: H. Awada (2014).*

For functional and defensive reasons, I deduced that the mezzanine floor level is the appropriate floor to propose an pedestrian network that link all the buildings (See Figures 5.16- 5.24). For functional reasons related to religious and social norms, I have chosen the mezzanine level as inhabitants will not accept the idea of an upper floor pedestrian network overlooking at their kitchens, bedrooms, bathrooms, and salons. But let us assume it is possible to propose a pedestrian network on the upper floors, this will prevent creating openings on the facades of the buildings. Moreover, The irregular pedestrian network (1.6m width) forces the air force to follow a nonsystematic and deceptive tracking process within the urban environment. Instead of following one horizontal pedestrian movement on the ground floor level, the air force has to follow also an additional horizontal layer of movement on the mezzanine floor level. This network is hidden and covered by 1.6 meter cantilever on the first floor level and crosses the dense green areas of the public spaces.

Problematic: The pedestrian network on the mezzanine floor level might not be acceptable in terms of the individual security of each building as it is similar to an enclave having its own gate and guard. But this does not mean that this is something sacred. We might think of block enclaves instead of a building enclaves.

Figure 5.16. Intervention: Plan at Mezzanine Floor Level (1/1000)/ Interlocking urban form (Irregular pedestrian network integrated with the attached buildings). *By: H. Awada (2014).*

Figure 5.17. Intervention: Plan at typical floor level (1/1000)/ Interlocking urban form (Irregular pedestrian network integrated with the attached buildings). *By: H. Awada (2014).*

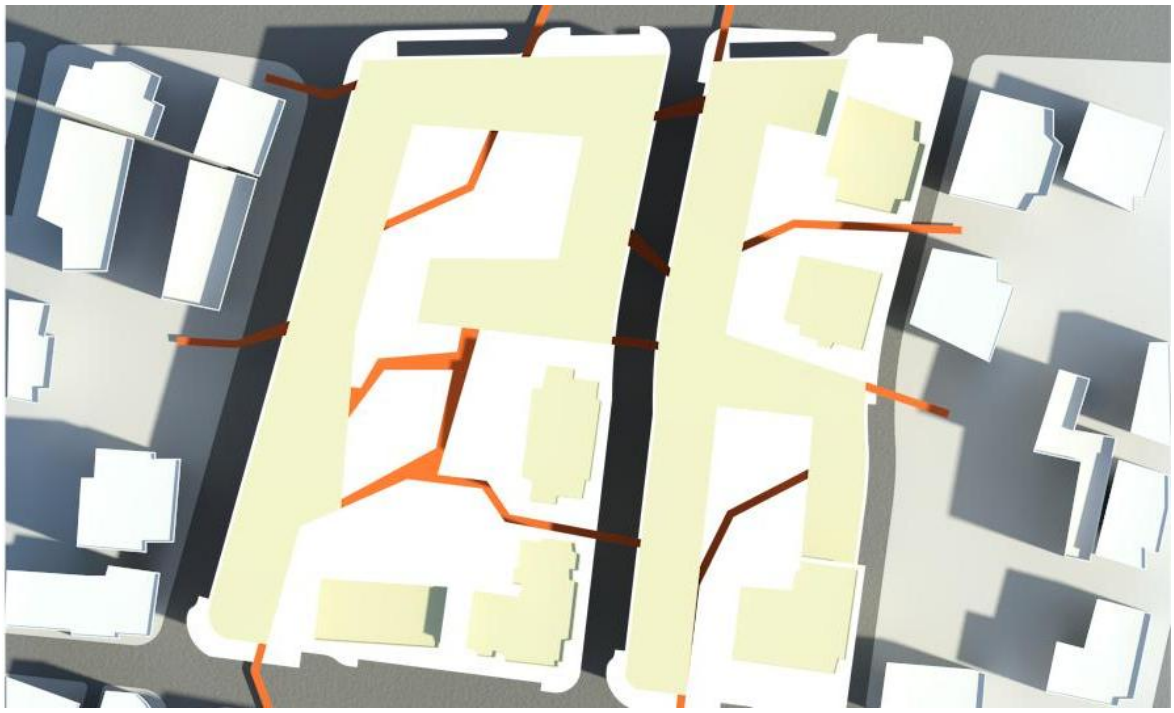


Figure 5.18. Intervention: Top view shot. *By: H. Awada (2014).*

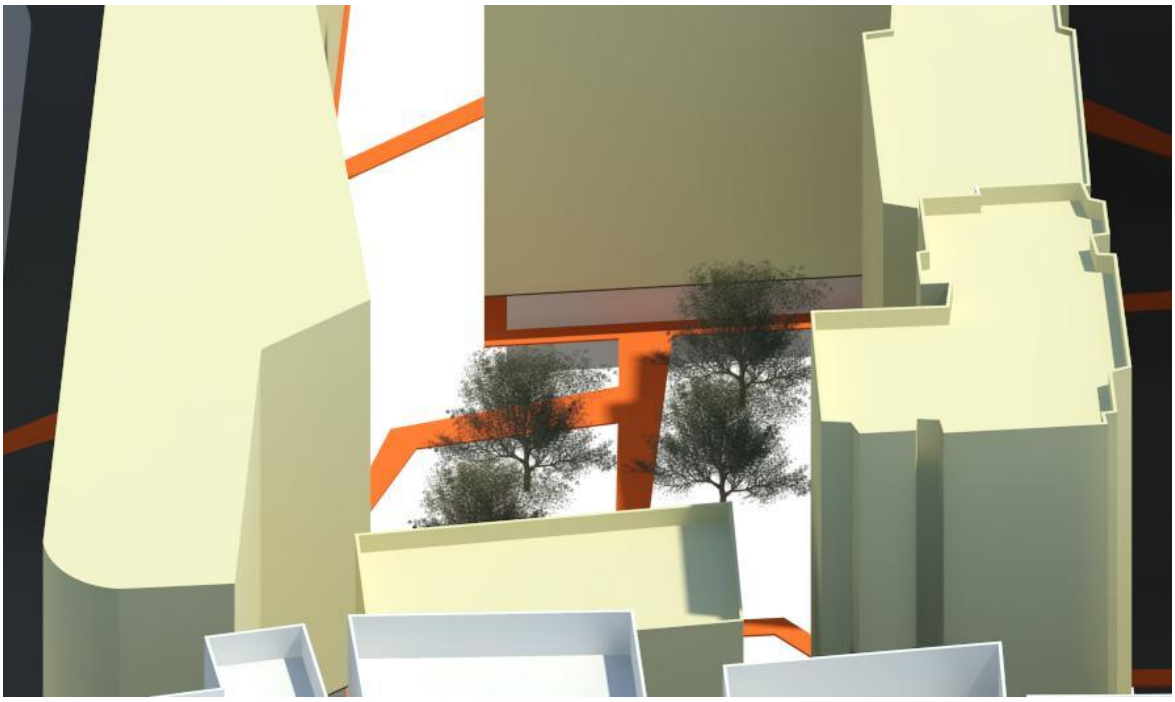


Figure 5.19. Intervention: 3D Shot for the greened opened space. *By: H. Awada (2014).*

Figure 5.20. General 3D Shot for the existing urban form. *By: H. Awada (2014).*

Figure 5.21. Intervention: General 3D Shot for my proposal. *By: H. Awada (2014).*

Figure 5.22. 3D Shot for the irregular pedestrian network. *By: H. Awada (2014).*

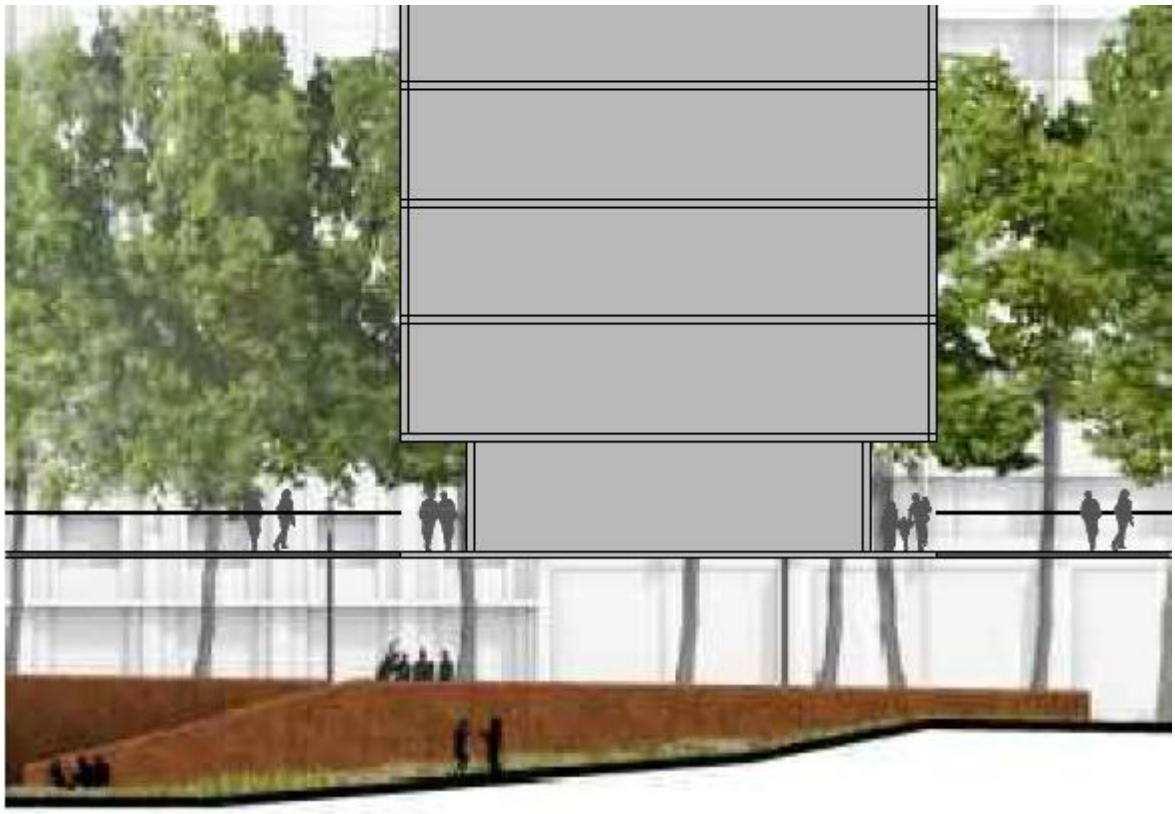


Figure 5.23. Intervention: Section showing the hidden pedestrian network covered by a cantilever (1/100). *By: H. Awada (2014).*

Figure 5.24. Intervention: 3D shot showing the hidden pedestrian network covered by a cantilever. *By: H. Awada (2014).*

As mentioned above, the design of the attached buildings intended to create internal open spaces distributed within the blocks. There are four open spaces dense with greenery which fit the defensible and livable agendas. Moreover, as the drawings show, the design proposes a green strategy for the streets which look like green corridors that totally hides the pedestrian and vehicular movements (see Figures 5.25- 5.28).

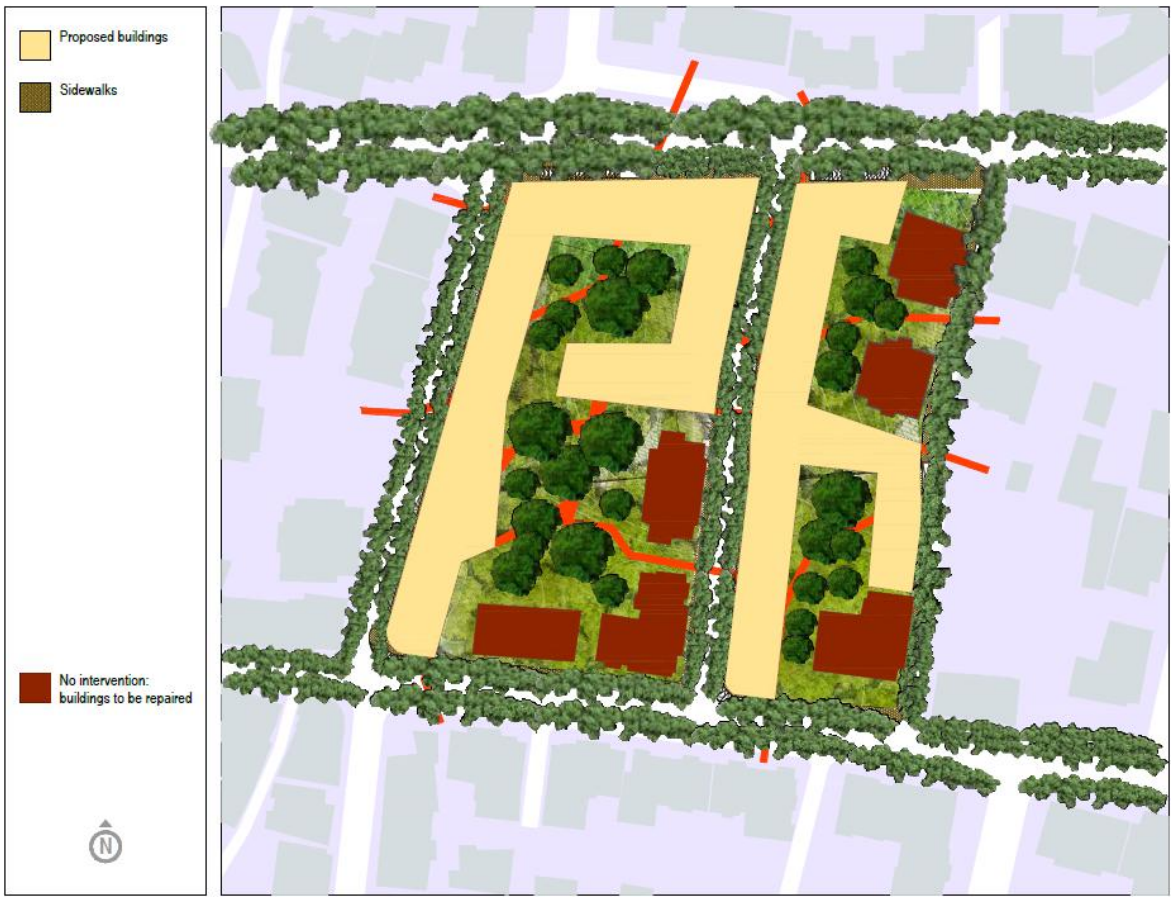


Figure 5.25. Intervention: Top View (1/1000)/ Landscape- Dense green areas and corridors. *By: H. Awada (2014).*

Figure 5.26. Intervention: 3D shot showing the dense green areas as well as the seasonal variation. *By: H. Awada (2014).*

Figure 5.27. Intervention: 3D shot showing the dense green corridors. *By: H. Awada (2014).*

Figure 5.28. Intervention: Section across the street. *By: H. Awada (2014).*

The Reconstruction unit at the American University of Beirut AUB proposed a general scheme for the public domain in the area of Haret Hreik. What interested me in this scheme are the green connections (added greenery) between the public green spaces. This establish the base for creating green corridors within the neighborhood which connect the different zones and blocks. So the below map shows my proposal in relation the AUB proposal and how it matches with their proposed green corridors and crosses them to finally provide general green corridors within the neighborhood (see Figures 5.29 and 5.30).

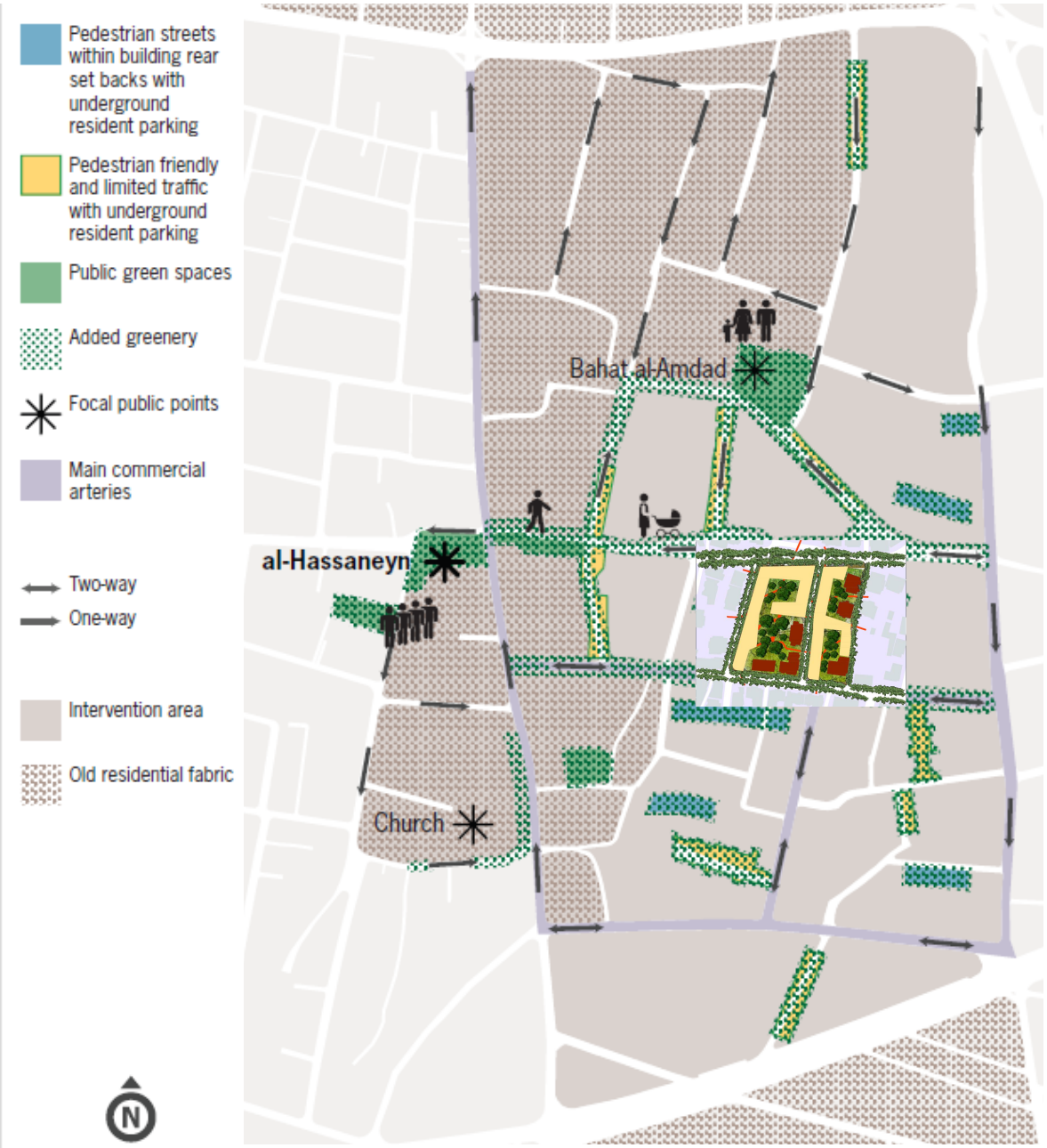


Figure 5.29. Intervention: My green areas and corridors in relation to the greenery provided by the AUB general public scheme. *Base map by: Fawaz and Ghandour (2007), the design proposal of the two blocks by: H. Awada (2014).*

Figure 5.30. Intervention: General 3D shot. *By: H. Awada (2014).*

Figure 5.31. Intervention: General 3D shot. *By: H. Awada (2014).*

In additional to the defensible and environmental benefits the green roofs offer and which have already been investigated in chapter III "A. Principles 06: Dense Green Areas and Corridors", my design brings to attention two main livable issues. First, and in terms of identity, green roofs are a symbol that reminds the inhabitants of Dahyeh of their rural context where most of them came from such as the Southern and Biqaa'i villages. This symbol will create a rural identity in an urban context which would be very desirable among the inhabitants. Socially, the attached urban form could sustain the social contact on building roofs similar to the existing one in the rural context. Green roofs will thus provide a suitable recreational place where families, neighbors and friends can gather, meet and enjoy time (see Figures 5.32 and 5.36).

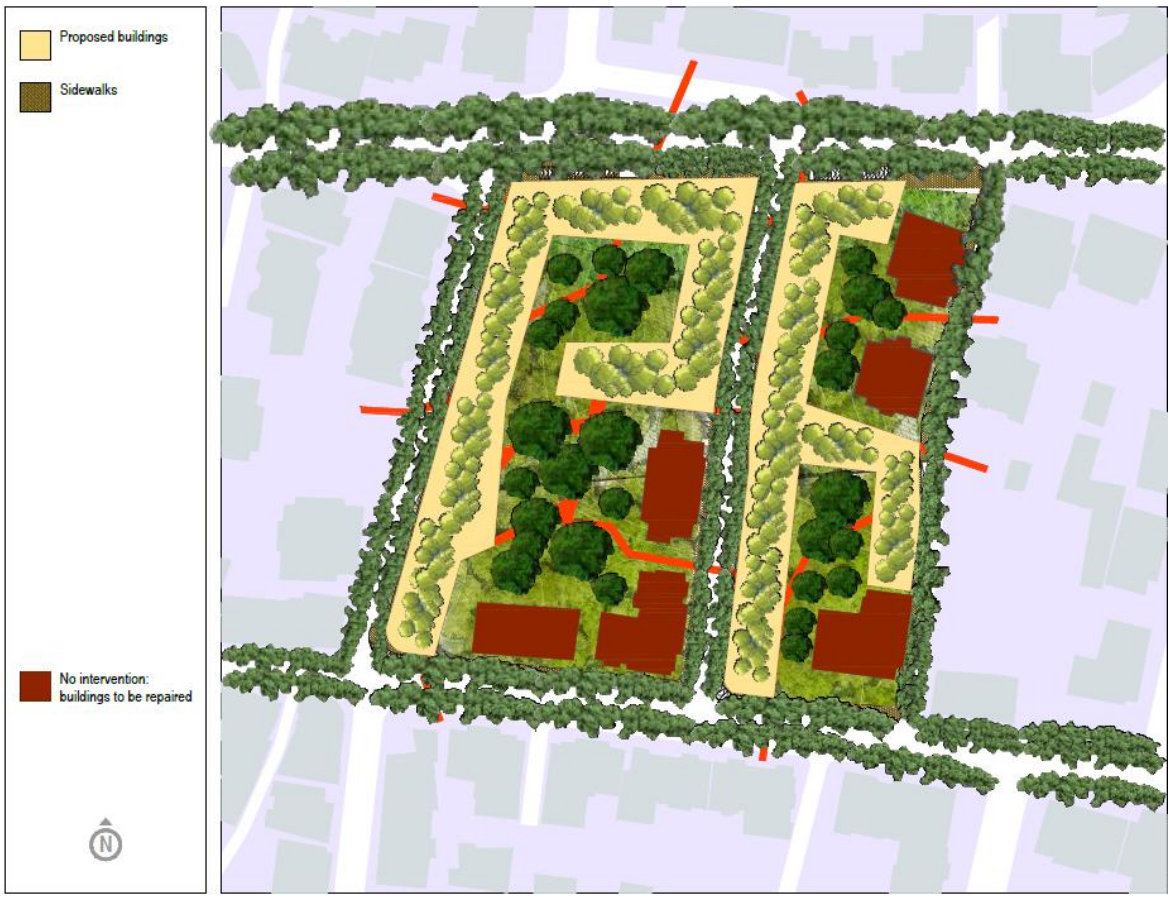
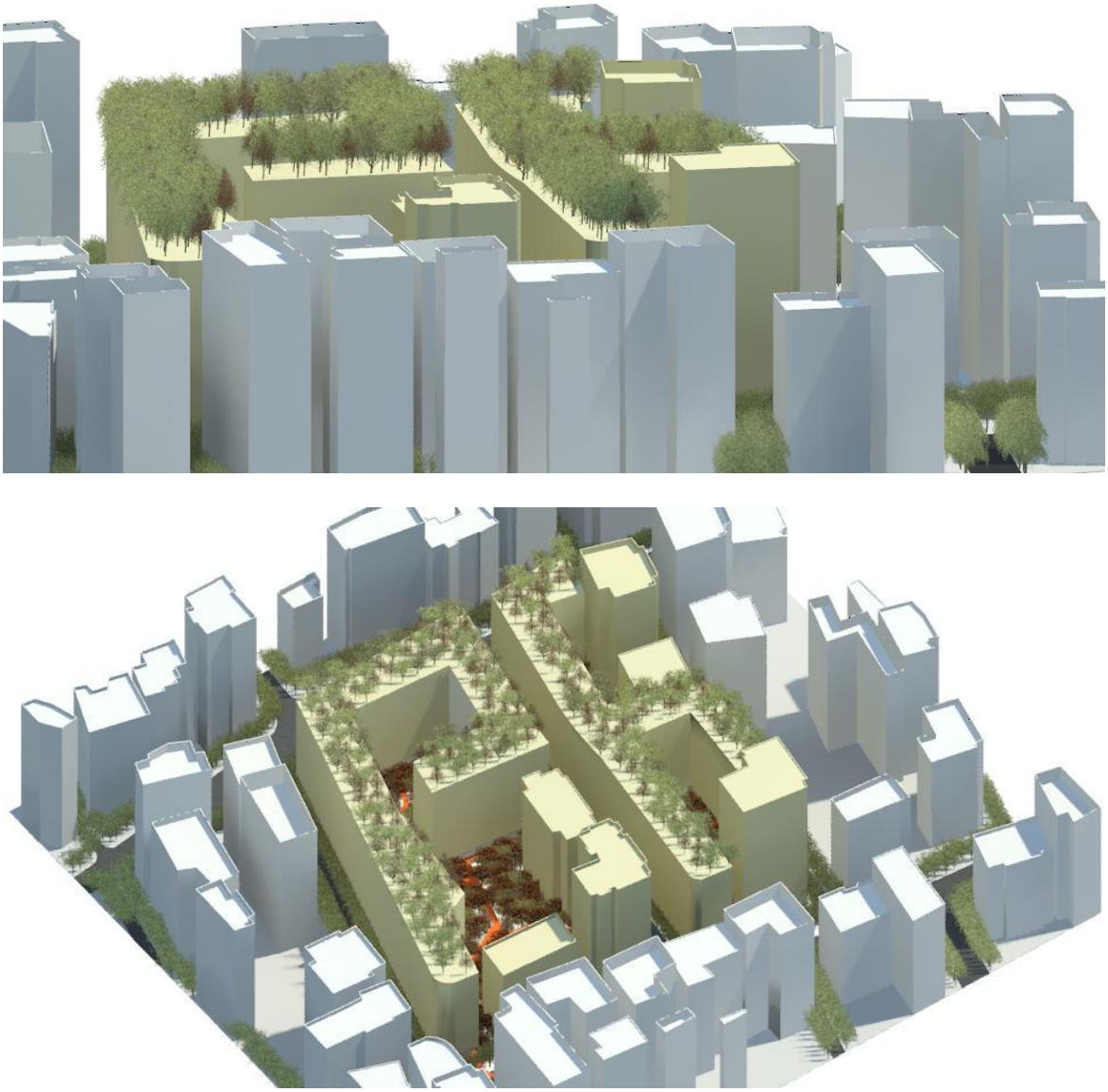


Figure 5.32. Intervention: Green Roofs/ Top View (1/1000). *By: H. Awada (2014).*

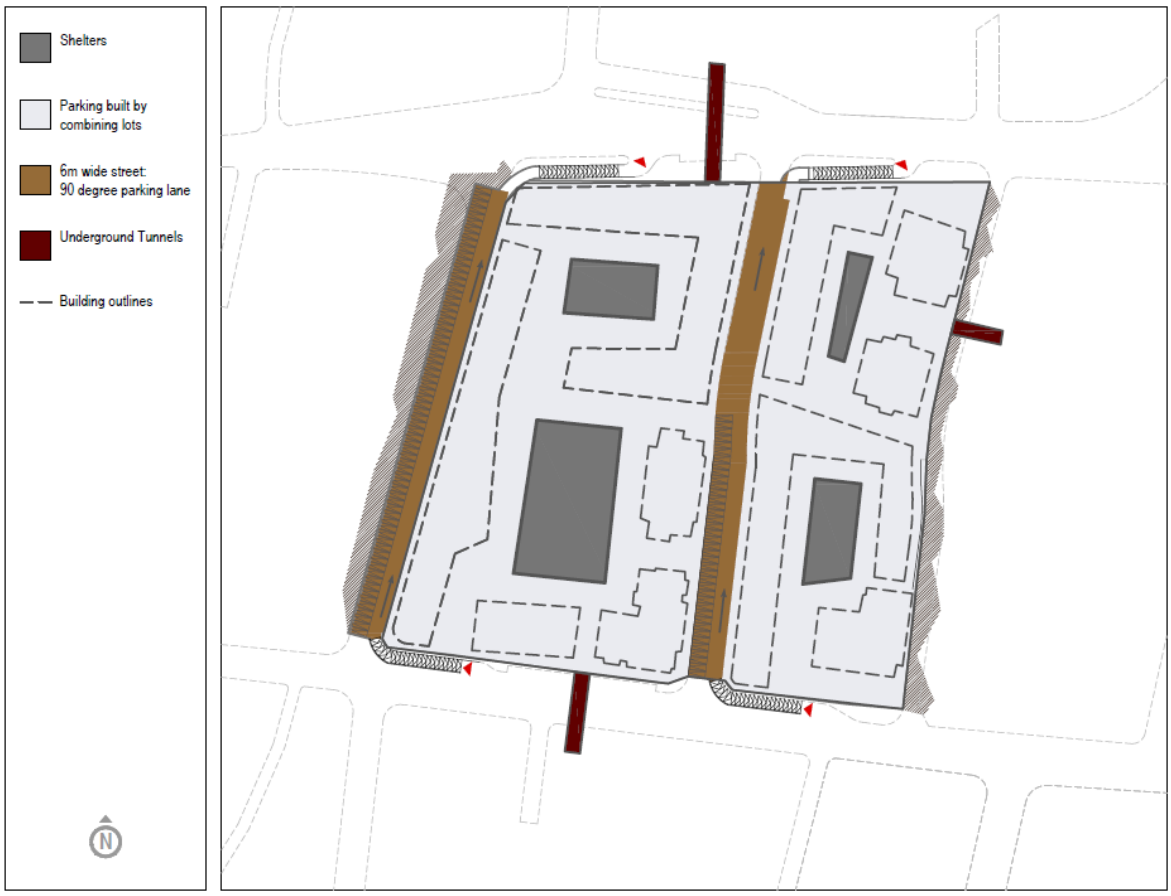
Figure 5.33. Intervention: Cross section (1/500). *By: H. Awada (2014).*



Figures 5.34 and 5.35. Intervention: General 3D shots. *By: H. Awada (2014).*

Figures 5.36. Intervention: General 3D shot. *By: H. Awada (2014).*

Even if the city's urban form is being fortified over the ground as the city has to breathe and survive, this does prevent exploiting the underground. My design proposes underground tunnels to connect the blocks and provide an underground and confidential accesses between them (see Figures 5.37- 5.40). Those tunnels are accessed from buildings' basements as well as from the shelters to facilitate the processes of evacuation during warfare. I would like to note that they might be used before, during and post war. In addition, my design alternative follow the defensible requirements of shelters. They are three large shelters located underneath open spaces and distributed among the blocks and not concentrated in one area. At the same time, my alternative improve car parking conditions by proposing underground parking located below rebuilt buildings, as well as under-street parking.



Figures 5.37. Intervention: Plan/ Subsurface Tunnels & Shelters. *By: H. Awada (2014).*

Figures 5.38 and 5.39. Intervention: Shelter sections. *By: H. Awada (2014).*

Figures 5.40. Intervention: Section showing a shelter underneath a greened open space. *By: H. Awada (2014).*

This chapter has shown how the principles of defensible urban form can cross the concept of livability and be implemented on densely populated environment. My design proposal in the neighborhood of Haret Hriek in Dahyeh is an example that proves this argument through the above illustrated urban design scenarios that deal with four urban elements that representing the primary tools: buildings, infrastructure, public spaces, and landscape. My alternative follow a rational and scientific methodology while approaching the urban design scenarios, and at the same time it conserves the social fabric as it was prior to the summer 2006 warfare but within a defensible physical envelope. This would be

the most desirable for the civilians of Dahyeh and for Hizbollah as they will not refuse such golden chance of fusing defense with livability.

Finally, and in any future warfare, the concept of defensible urban form for reconstruction is not something impossible or shocking to stop at or think of. And in any future warfare, the idea of fusing defense with livability in a highly dense environment has become applicable and implementable. My design proposal is not a myth but it is implementable and down to earth. It has moved the concept of urban form defense from the orbit of theories into the world of reality. And I end up by:

My design proposal is a precious, brave and rare approach to reconstruction...

CHAPTER VI

CONCLUSION: MAIN FINDINGS AND FUTURE RESEARCH

Design can be used as a surrogate for confrontation. Saliba (Forthcoming)

No city is fully defensible against military operations. Whatever defensible urbanism strategy it adopts, the city will remain vulnerable to targeting and bombing. If Israel followed the "Dahyeh Doctrine" which is the total annihilation of neighborhoods, the city cannot be defended. Similarly, the bombing of Dresden in Germany or the atomic bombings of Hiroshima and Nagasaki in Japan during World II prove again the vulnerability of the city. Similarly, random car and suicidal bombs cannot be totally blocked through urban design, although their incidence and impact could be limited to some extend.

Following the 2006 Israeli war on Lebanon, Israeli strategists concluded on the necessity to avoid a full scale and long war and to instead conduct a shorter attack and most probably targeted assassinations and use politics to degrade Hizbollah (Harel, 2012). Since 2006, Israeli targeted assassinations have mostly occurred in Gaza and not in Lebanon, but this does not mean that Lebanon would be out of this military equation in the foreseeable future.

Thus, my thesis aimed to design a neighborhood block that achieves two things. First, the neighborhood is defensible from the eyes in the sky that tracks the urban form of the densely populated environments to fire missiles and bombs from the air. My urban design

alternative aims to as much as possible blind those eyes and block them from identifying the urban form. To this end, my thesis has investigated eight defensible principles that support this aim. Second, my intervention serves as much as possible to limit the human casualties among civilians through two principles: limiting buildings heights and placing shelters underneath open spaces and empty lots.

"The ruins are painful to look at, but will hurt more in the long run if we try not to see" (Berman, 1996, 185). My thesis has proved that ruins are not necessarily painful as it depends on how we perceive them and what concepts we associate with them. Ruins are a chance for a change and can be nourished through what we have inside; we should approach them by heart and mind. Each one can approach this from his own perspective and in relation to his own school of thought, intuition and innocent imaginations. My thesis has proved that the destruction of cities could offer an opportunity to build a more defensible city able to confront the future warfare machine.

This thesis has proven that in asymmetric warfare, when the city has become the primary battle space, the spontaneous and complex growth of the densely populated environments could be defensively manipulated vis-a-vis the "targeted killings" operated by the air force. However, given that the city is a lived place where dwellers conduct their everyday lives, the thesis has accepted the premise that it would be impossible to think of the military exclusively as there would be no balance in relation to the civilians. Thus, the thesis investigated the possible balance that could be struck between on the one hand, its military defense, on the other, the concept of livability. Moreover, this thesis has proven that "much of the literature of fortification went on to form the core of an emergent field

known as *urban planning*" (Manaugh, 2010, 5). Therefore, rethinking military operations in the city leads to a more defensible city, while its ignorance leads to an easily targeted one.

Manaugh (2010, p. 5) argues:

> In another 50, 100, or even 500 years, then, will there be a defensive literature of the feral city, its systematic description, techniques for its defense (or obliteration), and its urban logic (or lack thereof)? Even if only on the level of urban form, this would be a fascinating journey, going from Castriotto's and Maggi's indirect streets to whole cities gone wild in the name of resisting outside intervention.

Misselwitz and Weizman (2003, p. 6-11) stated that:

> Military academies across the world show great interest in urban studies, in gaining more understanding of the ways cities work. Simon Marvin, Professor of Planning at the British University of Salford, has shown how armies set up many new urban research programs and allocate huge budgets for the study of cities. Suddenly, architects and planners are in high demand as a valuable source of knowledge... Architects and planners are and have always been service providers working for all sides. Some architects engage with urban warfare to develop and elaborate tools for the military, others to understand, expose, and oppose their methods. I think that this new military 'science' and these methods must be looked at and studied very carefully.

The political and military conflicts in the Middle East insure that the future of the region will be made up by warfare and city combats. Urban designers and planners must

seriously take into account the issue of warfare because it has been shaping the cities. Middle Eastern urban academics are very close to warfare and in continuous touch with it. They are the most responsible to deal with warfare as it has entered their city again the sphere of their everyday life. They have to enrich their researches and studies in relation to the discipline of military urbanism, and investigate the latest warfare's destruction and reconstruction technologies. Similar to the big effort being put in investigating social, economical, political, and livable issues, they have to put at least the same effort in investigating the military approach to cities to formulate a comprehensive and critical understanding of the physical environment. It is not anymore a choice whether to fuse the science of military urbanism with the disciplines of urban design and planning or not; it became obligatory.

In a question asked to Graham to predict, 400 years from now, what future cities will look like and the way they will be function and planned in light of the defensible urban form and designs, he replied:

> I think smart materials, nano technology and biotechnology will be woven into the architecture and geographies of cities...As 'ambient intelligence' and embedded or 'ubiquitous computing' become the means to orchestrate the world, formal defensive design may thus increasingly become more of a symbolic marker - a signifier of status, centrality and commercial power. (Finoki & Graham, 2007, p. 16)

But who said that formal defensible design of the city will give up its urban form shields and surrender? Who said that the city is not going to hearten and develop its

defensible strengths vis-a-vis the smart materials and nano technology? Who can assure that the evolution process of defensible urban form might stop?

In asymmetric warfare, anything is expected, no limits for possibilities, and this is the true meaning of challenge. It is very difficult to expect how far the current principles of defensible urban would remain effective within the developing technologies of the destruction, but this does not prevent us from continuing to ask how they could be reinvestigated and pushed further. It is very difficult to predict what the defensible urban form will look like in the future. The technologies and strategies of warfare confrontation are changing rapidly. The future remains ambiguous and surprising. However, this does not mean to stop using our insight to bring future researches which are worth investigating contemporarily:

How could we approach the city's urban form in relation to warfare when two guerilla fighters are confronting each other similar to what is happening in Syria nowadays? Similarly, what is the impact of suicidal operations on urban space? How could the design of urban space limit the damages and human casualties resulting from car and body bombings similar to what happened in Lebanon, and Syria and Iraq? What are the principles of defensible urban form in rural contexts? It seems that warfare strategies will always shock us as well as the city...

At the end, this thesis has totally convinced me that the best defensible strategy for the city against the sophisticated technology would be how simplicity can defeat complexity or how livability can defeat complexity. A simple tree in an urban space could be much more defensible than the exaggerated complex physical form.

As Ben Franklin says: *"An ounce of prevention is worth a pound of cure"*.

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