Urban form and insecurity: 
A case study of three districts in Baghdad

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Abstract

The research examines three districts in Baghdad, Iraq and poses three hypotheses: 1) urban form and structure impacts on the ability of residents to defend themselves; 2) adopted social behaviour of residents during times of terrorism affects social activity and hence urban structure; and 3) counter-terrorism measures used during times of terrorism affects urban form.

The research used a combination of fieldwork, surveys and interviews to confirm that the daily life and behaviour of residents of the three case study areas were significantly influenced by terrorist acts and counter-terrorism measures. However these influences varied by district and the results confirm that these differences were related to urban form. The results also show that the impacts of counter-terrorism measures are diverse and their impact is also dependent on urban form.

The research shows that despite the magnitude and scale of terrorist attacks within the case study areas, Rusafa (traditional form) and Falestin (mixed traditional/modern form) were more secure than Haifa (modern form).

The research is significant in two ways. First, at the local level it provides the evidence to inform individuals about the appropriate building materials, housing style and neighbourhood form and structure that will minimise the impacts of terrorism. Second, it provides research on previously unknown challenges and responses within diverse urban districts. This can bridge the knowledge gap regarding what happens within different urban forms during periods of insecurity and terrorism.
Statement of Originality

“This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.”

Signature .................................. Dhyaa M Albayati ............................

Publications
One journal article and one conference paper have been published from this thesis

Journal articles:

Conferences:
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Chapter 1: Conceptual Framework and Introduction

1-1 Preface

Throughout history, Mesopotamia has been affected by both external and internal threats and crises. At various times in the past, the area has been controlled by Persians, Maculs, Turkmen tribes, Arabs and Ottomans. During these periods, the people of the region were subjected to extremely harsh conditions, and therefore many successful achievements, including legislation, rules and heritage, were significantly affected.

Baghdad, as the capital of Iraq (formerly Mesopotamia), has undergone considerable transformation throughout its history. Some changes have been due to socio-economic factors and others are the result of wars and colonial control. During the eighth century, Baghdad (762-766 AD) was originally designed as a round, fortified, defensive city. The city changed significantly during its occupation by the Ottomans, and continued to change during periods of control by other colonial powers.

In addition to the events that occurred in the distant past, Iraq has experienced many destructive events during the past three to four decades. These events are related to the nature of authority and rule in Iraq, and also to external invasions, including the four destructive periods shown in Figure 1-1.

The first of these periods was the Iraq-Iran war which took place between 1980 and 1988. During this war a significant number of lives were lost, as were many of the country’s resources. This war was one of the longest of the 20th century, and left hundreds of thousands of people dead or wounded. The underlying causes of the war depend on the point of view of the particular commentator. Some suggest that the country’s boundaries and resources were the reasons, while others believe it related to rivalries between Ottoman and Persian Empires. Regional competition and conflict among neighbouring countries increased the length and scale of this war. In his book, ‘The Longest War, The Iran-Iraq Military Conflict’ Hiro (1989) indicates that the war cost Iraq $90 US billion during a 95 month period, with about $85-90 billion given as loans and grants from foreign countries.
The second destructive period relates to the Iraqi invasion of Kuwait in the beginning of 1990, which continued for about a year. This period was considered to be the worst in Iraq’s modern history, due to the enormous number of lives lost (more than one million people were either killed or wounded), the extensive damage to key infrastructure and widespread environmental pollution (Hiro, 1989).

The third period from 1990 to 2003 involved economic sanctions directed at the Iraqi people. For much of this time there were insufficient supplies of food and medicine. To survive, people had to schedule and organize their daily lives around the little food provided by the government. As Arnove and Abunimah (1996) illustrate in their book ‘Iraq under Siege, The Deadly Impact of Sanctions and War’, one of the most devastating impacts of economic sanctions was their direct effect on the Iraqi people. They argue that about 500,000 Iraqi children died, mainly due to lack of food and sanitary services, but also as a result of the coalition’s increased use of cluster bombs.

Moreover, this period affected urban life and its facilities and services. It impacted on individuals’ social relationships, on society overall, on gender roles, on skills and on participation in political action through “impoverishment of the well-educated middle class, wide-scale unemployment and economic crisis” (Al-Ali, 2005).

The fourth period occurred after 2003 with the downfall of the ruling regime, which resulted in a major shift in the ways in which people lived their daily lives in Baghdad. In spite of an improvement in individuals’ daily lives and incomes, security concerns resulting from terrorism and counter terrorism measures dramatically affected urban life. Moreover, these practices had a devastating impact on the country’s physical form and structure, infrastructure, economy and social capital. Almukhtar (2014) argues that this period represented a turning point in Iraq’s history, because it was an urban war directed towards civilians and their daily lives and activities.
Throughout these four periods, the form and structure of the city of Baghdad, as well as any plans for the future, underwent many challenges and faced many threats. Some of these threats, impacts and challenges are well known, but others have been changeable and unpredictable.

1-2 Problem Statement

Because little research has been undertaken into the implications of war and terrorism on urban form, there are many unknowns. Many challenges face urban environments during periods of insecurity. In his book ‘Cities in a Time of Terror’ Savitch (2008) argues that extreme situations and unclear statuses, as well as restrictions in sources, make it very difficult to ascertain to get an accurate picture of these impacts.

Moreover, differences in how urban planners choose what defensive and protective urban strategies best respond to terrorism can complicate daily urban life, rather than making it easier. For example, there have been discussions regarding the role of urban form and structure in reducing or increasing the impacts of war and terrorism, and how they shape behaviour. Le Corbusier and his colleagues supported a vertical expansion to escape the consequences of war (Graham, 2008), whereas Newman (2009) and his colleagues placed emphasis on the concept of horizontal expansion. A related problem is the lack of knowledge regarding the kinds of urban form and structures in place, as well as building designs and materials that should be used.

Overall, the research problem has three components:
1- Lack of clear definition relating to the most protective and secure built forms and how planning can best respond. This is due to: a) the shortage of research conducted in terrorism affected urban areas; and b) the changeable and unclear tactics used by terrorists.

2- Lack of information and awareness about the most appropriate designs and built forms that should be used in war affected areas, when faced with the absence of or weakness in, planning controls and monitoring by municipalities.

3- Lack of co-ordination and cooperation between urban professionals (planners, designers and policy makers) and security organisations and institutions.

1-3 Conceptual Framework of Thesis

The research focuses on the following elements that make up the conceptual framework of this thesis: human behaviour, urban form, terrorism, and urban controls, as illustrated below in Figure 1-2.

The diagram shows the relationship between human behaviour, urban form, terrorism/counter terrorism, and urban controls. According to the framework, urban form affects both human behaviour and terrorism. Conversely, urban form can be affected by terrorism and human behaviour, and urban controls and legislation affect urban form, human behaviour and terrorism/counter terrorism. This research effort focuses on only three of these relationships: 1) the impact of urban form on human behaviour and urban form and structure; 2) the impact of terrorism/counter terrorism on urban form and human behaviour; and 3) the impact of urban control/ legislation on terrorism/counter terrorism. This conceptual framework is used as the basis for organising the structure and content of the literature review in Chapter Two.
1-4 Research Hypotheses

The primary goal of this research is to better understand the relationship between urban form/structure and residents’ behaviour during times of terrorism and violence, and to identify how urban form is affected by terrorism/counter terrorism. The research poses three hypotheses:

1- Urban form, spaces, and structure can either increase or decrease an urban area’s ability to defend itself and its inhabitants, and hence can increase or decrease the magnitude of changes in the physical form.

2- Individuals, and their adopted social behaviour during times of terrorism, affect social activity and hence urban structure.

3- Security measures and arrangements used during times of terrorism affect urban form.
1-5 Research Aims

The objectives of this research include:

1- Identifying how different urban forms can create different behavioural responses.

2- Identifying how individuals living in areas of Baghdad with different urban forms respond to terrorism. This in turn leads to two questions:
   A- How does individual behaviour change during insecure conditions due to terrorism, and what safety arrangements are adopted to cope with these circumstances?
   B- How do residents’ responses to terrorism impact upon urban form and structure?

3- Identifying the range of counter-terrorism measures used by government, with particular interest in:
   A- The type, extent and effectiveness of security measures in terms of preserving life, daily routines and deterring terrorist acts.
   B- Which types of security measures had the greatest negative impact on urban form and structure?
   C- Identifying how some types of security measures can be integrated to preserve the daily routines of residents.

4- Creating a collaborative domain that brings together urban planners and security experts to develop strategies for integrating urban planning and urban security, resulting in better outcomes for residents.

1-6 Research Significance

The research is significant in two ways. First, at the local level it provides research to inform individuals about the appropriate building materials, housing styles and neighbourhood form and structure that will minimise the impacts of terrorism.
Moreover, it suggests that collaboration between urban planners and security experts could result in communities successfully overcoming terrorist threats.

Second, at the international level, it provides research on previously unknown and unpredictable challenges and responses within diverse urban districts. This can bridge the knowledge gap regarding what happens within different urban forms during periods of insecurity and terrorism, and the impacts of these responses on the urban environment.

1-7 Overview of Thesis

The thesis involves seven chapters organized as follows:

The first (current) chapter includes an introduction and a problem statement, followed by the conceptual framework of the research that gives a brief detail of the research contents. In this part there will be a concentration on research hypotheses, aims and research significance.

The second chapter provides a review of the literature, which is organised around three themes. The first focuses on the literature which deals with the impacts of urban form on human behaviour and cities’ structures and facilities. The second concentrates on the literature which highlights the impact of terrorism and insecurity events on urban form and human behaviour, and the third theme focuses on the impact of urban governance versus non-governmental organization on urban form and daily life during periods of high insecurity.

The third chapter has two parts and describes the geographic focus of this research. The first section gives a detailed background on Baghdad, including its history, urban governance and urban transformation. The second part focuses on three Baghdad case study areas and provides the boundary of each case study area, its population characteristics and distinctive features. It includes a comparison of the three case study areas related to the relevant planning regulations and design guidelines.
Moreover, it displays the evidence of war and terrorist effects within the city of Baghdad generally, and on the three case study areas particularly.

The fourth chapter outlines the research questions and methodology. It involves specific questions and the purpose of each question, as well as the methods and strategies used in data collection and analysis. Also, it includes safety and ethical considerations, as well as discussing the limitations of the research.

The fifth chapter discusses the results of the research, and includes three main sections representing the data sources: the first is an analysis of the fieldwork; the second is the fieldwork survey; the third is based on interview data.

The sixth chapter is a discussion involving the three axes which link the research hypotheses and questions, and which support them through the research results.

The seventh chapter provides the summary and conclusions. It summarises the methods used by individuals to cope with terrorist acts, as well as the governmental measures used to deter acts of terrorism. Also, it summarises the components of urban form within three neighbourhoods in Baghdad as well as presenting a conclusion.
Chapter 2: Literature Review

This chapter involves three parts; the first provides a review of the literature on urban form and its effects on human behaviour. The second part examines the impact of terrorism and security considerations on urban form and structure and focuses on the social, economic and environment elements. The third part demonstrates the role of urban governance and non-governmental organisations during times of insecurity.

The times of insecurity involve war and terrorism, which usually destroy urban areas, and pose significant challenges to activities and the form of cities. In this chapter, the impacts of terrorism will be focused on reviewing the three-abovementioned parts.

The research attempts to include all literature including Arabic language and international (English language) literature. The use of Arabic literature in this thesis is sparse for two reasons: the first is that the topic is new and more complicated in terms of security and privacy considerations. This in turn caused a shortage in this sort of research in Arabic literature. The second is that approximately all the local researchers are using international channels (English language) to publish their research.

2.1 Urban Form and its Effect on Human Behaviour

Urban form is the result of public and private sector development activities. It affects human behaviour through orienting, shaping, and controlling daily activities, movements and relationships. To begin this review it is necessary to define what urban form means. Urban form can be defined from various perspectives: from an architectural point of view, it is the form which can be configured due to the relationship between buildings and outdoor spaces within an existing landscape. According to this perspective, three elements contribute significantly in shaping the characteristics of an urban form; buildings’ layouts, the outdoor spaces, and landscapes.

Urban form from a free-market and spatial perspective is the form which evolves as a result of locational decisions of thousands of households, and policies of private sector and public-sector agencies. So it is a spatial configuration of urban elements which includes spatial patterns (land uses and density as well as the spatial design of
Urban form impacts on cities’ structures and components as well as on human behaviour. It can be oriented to improve cities’ productivity and liveability as well as residents’ behaviour through creating “active, healthier, and more liveable communities” (Handy et al., 2002). In addition, it can affect individuals’ and public health by influencing their practice of urban physical activities; so it determines the household activity patterns (Frank & Engelke, 2001). It also plays a significant role in increasing or decreasing the populations of cities and individuals’ safety and security (Newman, 2009).

Over the past centuries, several factors have been behind the formation of different sorts of urban forms. Issues of security and safety were key factors when the initial settlements were built. The distribution of economic activities contributed to the configuration of urban forms. The research shows that the concentration of urban economic activities and population in specific areas contributed significantly to the creation of the urban compact form, whereas the dispersion of urban activities and population were behind urban sprawl forms.

The research confirms that urban form elements can contribute considerably in creating a sustainable, resilient, and active environment. They impact significantly on the physical, social and security elements within a city.

2.1.1 Physical Elements

Density and Land use. Building density and housing type are two key aspects of urban form. They can be oriented to increase urban productivity, sustainability, and social equality. Bramley and Power (2009) show that there is a strong relationship between urban form (density and housing type) and social sustainability. They found that those who live in compact, high-density, mixed-use forms are better off because they have social equity and easy access to urban services, facilities, and opportunities. High-density residential form has a key role in increasing the interaction among residents, through increasing the opportunity of daily meetings and contact, compared to low-
density areas. Moreover, high-density neighbourhoods are environmentally friendly places, where walking, bicycling, and using public transport are strongly preferred (Saelens et al., 2003; Wang et al., 2016).

**Housing.** This sector includes housing types and density and land use characteristics, including a mixture of activities, and this has a major role in ensuring efficient energy use and reducing environmental impacts. The research highlights that single-family housing consumes twice per capita than multifamily housing use. High-density urban form, which includes a mixture of housing, shopping, and working areas, will considerably support urban sustainable development. High-density housing provides easy and short access to central urban services and transport systems, and hence reduces the household consumption of energy through lower car usage (Holden & Norland, 2005).

In spite of these distinctive characteristics, some researchers argue that an increase in centralized activities within urban centres, as well as high density buildings, are closely interrelated reasons to disperse an urban form. These characteristics decrease the quality of urban life through increasing urban traffic congestion and pollution and reducing recreational and outdoor spaces. Moreover, they increase the cost of land due to commercial purposes; these in turn encourage housing sectors to avoid urban centres for new residential projects. These factors indirectly encourage urban sprawl (Camagni, Gibelli, & Rigamonti, 2002; Jenks & Burgess, 2000).

Urban land use contributes significantly to supporting and strengthening urban spaces and guiding urban density. Hillier and Hanson (1984) found that mixed land uses ensure that private spaces support public spaces and increase relationships which “helps to influence the vitality of public spaces” and in doing so, increases urban density. Thus better distribution of space and land use increases interaction among inhabitants and ensures a strengthening in correlation. This relationship can be seen clearly in traditional urban forms, but tends to be lacking in contemporary designs (Roberts, Lloyd-Jones & Coupland, 1997). The figure below illustrates the successful interaction between spaces and land uses.
Moreover, land use planning, including correct siting for buildings, such as schools which provide safe and easy access for students to walk or bike, motivates students to practice regular physical activity, in turn forming healthy habits and behaviour patterns in the future (Schlossberg, 2006). The research confirms that land use planning should be sustained by constant interventions and policies which support urban land use and increase urban form effectiveness through providing active physical and outdoor spaces.

These interventions and policies include zoning regulations, building codes and environmental changes brought about by builders’ practices, which can play a significant role in increasing urban physical activities and improve residents’ health (Health et al., 2006).

**Infrastructure.** Urban infrastructure includes all the services and facilities which sustain urban daily life. These involve urban transport (modes and routes) and energy. The following discussion illustrates the effects of urban form on infrastructure elements.

**Transport Infrastructure.** Recently, researchers have paid a great deal of attention to the role urban form plays in reducing the use of automobiles. Some researchers focus on the role of urban elements’ design, such as building blocks and streets in minimizing
car use, while others concentrate on land use policies as a way to achieve the proper and distinctive distribution of land for activities which reduce the trip distances and numbers. Also, there is a concentration on the role of transport schemes in reducing private car use through increasing driving costs, accompanied by the provision of alternative affordable transport modes (Crane & Crepeau, 1998). Moreover, Newman and Kenworthy (2006) confirm that reducing car dependency can be achieved through minimizing urban intensity (residents and jobs), which will create pedestrian friendly neighbourhood centres which are completely dependent on transit.

Likewise, urban form has a concrete role in creating safer and energy efficient transportation. For example, the design of urban form elements (outdoor spaces and streets) including road regulations, signs and safety arrangements will increase road safety and form activity. Research shows that about 20,000 injuries in traffic crashes were due to the disorder of infrastructure facilities and the casualties were pedestrians (McMillan, 2005). In the meantime, transportation routes can be oriented to increase the safety and security of the residents and the community. Fabiyi (2008) indicates that street layouts, in particular compact street design, can be part of society’s safety and stability; it can be used to enhance social interaction and relationships; hence the layout of the streets can encourage social cohesion and assist in protecting residents from external threats.

Conversely, some research argues that urban infrastructure, including urban spaces and streets, can play a negative role through creating and motivating violence and insecurity, particularly in developing countries. For example, what happened recently in the Middle East where changes in the authorities and insecurity circumstances were the result of the streets being shared by homeless people and street vendors during times of highly politically charged situations. Bayat (2012) describes this particular street situation as being a “political street” or “Arab street”, where in order to survive, poor people and street vendors spread their lives and businesses into streets and sidewalks and squatters move in. They share each other’s feelings, public opinions, and poverty, therefore these venues are considered the main places where unruly elements collect and are directed towards unwanted political situations. Moreover, they are the venues where unknown people and strangers can be found to achieve
specific objectives. Therefore, this type of violence is listed as a local level of violence, driven by failed governance. This in turn leads to social inequality and increased divisions among social groups in politically unstable countries (Bahgat & Medine, 2013).

McMillan (2005) shows that urban form elements including the dimensions of city blocks, width of transport routes and lack of outdoor spaces and sidewalks contribute negatively to reducing walking and bicycling behaviour and increasing private car use. This in turn affects public health and the transportation system. He confirms that the access to outdoor spaces and infrastructure, including the pedestrian paths, length, width, and availability of travel routes are important factors in shaping individuals’ walking behaviour.

Likewise, Giles-Corti et al. (2013) show that the layout of paths, routes and other transport facilities within the structure of urban form can contribute greatly to the encouragement or discouragement of transport-related walking, and physical activities’ related walking. This in turn can affect individual travel behaviour. They highlight that the design of urban form elements affects urban daily activities by influencing the locations and proximity of activities.

Moreover, urban form plays a major role in shaping individual travel behaviour through controlling household daily travel; this can minimize motorized travel and reduce its environmental impacts (Van Wee & Handy, 2014). Handy (1996), shows that the residents of old, high density districts are travelling less in terms of number and distance of trips than the residents of new, low density districts. This claim has been supported by Boarnet and Crane (2001) and Ma, Mitchell, and Heppenstall (2014), who confirm that the residents who live in high density, mixed use districts own and drive fewer cars and tend to depend on alternative transportation modes.

Energy use. Research confirms that urban form can considerably affect urban daily consumption of energy; this involves the energy consumed by industrial, transportation, residential, commercial and other urban sectors. Ewing and Rong (2008) make a comparison among the residents who live in sprawling and compact
forms in terms of their energy consumption. They show that the residents of sprawling urban forms have more tendency to live in detached and large houses, compared with the residents of compact forms; therefore they consume higher energy than the inhabitants of compact urban forms. Moreover, the residents of sprawling urban forms in some developing countries depend increasingly on private cars, due to the extended suburban sprawl as well as the lower availability of access. These affect and increase their travel; hence their energy consumption.

Urban form elements, including density and land use, can contribute significantly to reducing or increasing the transport sector’s demand on energy. This in turn will decrease or increase their environmental implications. Mindali et al. (2004) shows that there is a strong correlation between land use policy and daily energy consumed by transportation. They confirm that the policies which encourage inner centres with high density and mixed use are ideal in reducing automobile use and encouraging public transport, so these positively reduce the consumption of energy. According to this type of policy, the consumption of energy in high density neighbourhoods will be lower than that in low density districts, see Figure 2-2 below.

Figure 2-2: Gasoline use per capita versus urban density (1980)
Source: Mindali, Raveh, and Salomon, 2004
Urban form elements including buildings’ envelopes, materials, locations, and designs significantly influence energy consumption and the magnitude of pollutant emissions. Lebel et al. (2007) confirm that the proper siting, design and orientation of buildings, on one hand and the correct selection of materials and structures on the other hand, are considered to be key planning and architectural principles which contribute considerably in reducing energy consumption within an urban environment.

2.1.2 Social Elements

It has been mentioned previously that urban form can play a major role in decreasing or increasing the use of physical and social activities; this affects health-related activities and society overall. Urban outdoor spaces including urban parks, public open spaces, and green areas are of major importance; they provide leisure and recreation spaces which contribute significantly to fulfilling the social needs of urban residents. These spaces contribute to the enhancement of the quality of urban life and ensure individuals’ well-being (Loukaitou, 1995).

Likewise, the coherence of urban form elements is another factor that helps to enhance the quality of urban social life by increasing social interaction. It increases spatial and functional interaction among the urban elements and increases the human correlation to the surroundings.

The functional and physical components of these interrelated systems enable, and/or enhance, societal living conditions. Attempts to deconstruct the spatial relationships among urban spaces and functions will severely impact the physical and social fabric, and ultimately the urban physical form and social activities (Beall, 2007).

This relationship has been operating in traditional forms, but is often missing in contemporary forms. The most significant missing element is the connection between interior and exterior spaces.

From the Hellenistic stoa, to Roma porticoes, to the retractable street canopies of a North African souq, to the canvas wings of stores and open-air markets, an intermediate space was defined under different conditions.
and for different occasions as well as defining a pedestrian environment.

(Salingaros, 2000)

He confirms that a better understanding of the relationship among urban elements may strengthen the geometry and support at different levels, whereas misunderstanding the nature of this relationship leads to incoherent, isolated and vulnerable urban forms that can easily be penetrated, and affect social activities and coherence. The figure below illustrates the role of urban elements in creating a coherent and correlated form which will secure and improve urban social life and activities.

![Elements aligned but not coupled](image1)
![Elements coupled but not aligned](image2)
![Coupled elements aligned](image3)

Figure 2-3: The role of design in creating coherence and correlated spaces and forms
Source: Salingaros, 2000

**2-1-3 Security Elements**

Urban form and design play a principal role in providing a safe and more secure environment. Recently, new terms such as “terror”, “crime”, “violence” and “counter-terrorism” have been increasingly highlighted in the design of contemporary cities and urban forms. For example, adopting the concept of “crime prevention through environmental design” in contemporary urban design and form confirms the importance of such concepts and designs in securing urban life and activities through reducing and stopping acts of crime.

The research shows that urban form and design can contribute significantly to shaping individual behaviour, and if not done properly, can increase violence and crime. Jeffery (1971) adopted the concept of crime prevention through environmental design (CPTED). He found that an urban morphology and building design can increase or decrease social interaction and cohesion to deter crime.
The (CPTED) concept highlights the point that successful urban form and design is an important defensive element that should be supported and strengthened by natural and technical defensive measures. The CPTED consists of two concepts: the first generation concept involves six dimensions, including “territorial reinforcement, surveillance, image, access control, legitimate activity support, and target hardening”, and these can contribute considerably to deterring criminal acts. The second generation concept is based on four key dimensions, and these are cohesion, connectivity, and culture of social groups as well as the capacity of community, see Figure 2-4 (Cozens & Love, 2015).

Figure 2-4: Model of integration between first and second generation dimensions of CPTED
Source: Cozens & Love, 2015

Research confirms that understanding the nature of surrounding threats and crime can support the idea of CPTED. Nick Goldby (2013) suggests that the capability to create and deliver a safe and secure design emanates from best understanding of the nature
of the threat and proposed terror attack, regardless of the size and source of threat and security measures used. He introduces the Queen Elizabeth Olympic Park in London as an example of designing out of crime projects that succeed in providing safe infrastructure and systems which enabled seamless transition and more security to Olympic park participants and visitors. According to Goldby’s (2013) discussion, the main reasons behind the success of this project as a safe and secure park were that during the construction stage the project was dealt with as several separate projects, each with no remit or relationship with surrounding parts. Therefore, urban form accompanied with best understanding of the nature of threats contributes considerably to guaranteeing a safe and more secure environment for urban residents.

The role of urban form in securing urban residents and activities was highlighted by Oscar Newman (1995) in the case of the Clason public housing project in South Bronx, New York. He found that restructuring the physical form and layout is one way of creating defensible spaces. He shows that designating access and egress to an area and using hierarchy among the spaces can restrict criminal behaviour (see Figure 2-5) because these can be controlled by residents (Newman, 2009). He describes a successful defensible space as a place that gives pedestrians a series of psychological cues to guide their movement and behaviour, and to ensure strong social correlations among their inhabitants and a successful combination of urban elements and spaces.

![Figure 2-5: Hierarchy of defensive spaces](image)
Newman also describes how urban form elements such as overhangs, small courtyards and decorative bollards can be used to increase security through creating a feeling of fear which guides travellers, and hence controls their behaviour. He confirms that these elements were played as natural physical elements which significantly impacted on individual behaviour.

This concept was also adopted by Michael Brooke (2013) and his colleagues, who indicate that the built environment can impact on the behaviour of even those who are passing through. This concept aims to create an environment where security staff and teams feel safe and secure, whilst at the same time criminals feel that they can be easily detected. Newman and Michael supported the horizontal role of urban form components in securing the residents’ lives and reducing the impact of crime, whereas Le Corbusier was in agreement with vertical expansion and supported the skyscraper’s role in minimizing the impact of war on individuals’ lives and environment. He confirms that the horizontal sprawl of cities and direction towards the sky increase the destruction and risk resulting from aerial bombing and gas attack (Graham, 2004) see Figure 2-6.

Le Corbusier indicates that the urban form and landscape can play a significant role in minimizing the effects of aerial war (aircraft bombing); he shows that the urban forms with high-rise buildings have less possibility of being targeted compared with compact urban forms (Graham, 2008).

Meanwhile, attempts to combine design elements, parts, and building materials as well as identifying the strengths and weakness of the built environment (urban forms, and structures), have a key role in enhancing the built environment and supporting the concept of crime prevention through environmental design. This issue was highlighted by Jonathan Knapp (2013), “Urban design, in conjunction with the older, more established disciplines of architecture and town planning, is increasingly important in shaping the built environment, particularly, in term of crime and safety issues”.

Source: Cozens & Love, 2015
This concept is also supported by Boyd and Linehan (2013). In their book “Ordnance: War+ Architecture & Space” they focus on the importance of creating a unique, invisible combination between buildings and environment through the so called “design of war landscape”, see Figure 2-7. This strategy involves the use of camouflage elements to protect and defend strategic military and civic locations. These camouflage elements consist of both natural and artificial elements such as the use of land vegetation, site, forms, colours and textures.
Figure 2-6: Le Corbusier’s 1933 Ville Radieuse designs for defensive apartments and blocks.
Source: Graham, 2004
Figure 2-7: The use of landscape camouflage to increase invisibility
2-2 The Impact of Terrorism/Security Measures on Urban Form and Human Behaviour

Urban form has experienced considerable challenges and changes due to internal and external threats and events that have destructively affected urban form elements. These destructive events were the result of two main causes - natural disasters and man-made disasters. Public concerns have significantly increased and the challenges to cope with these disasters differ greatly, depending on pre and post events’ arrangements.

Man-made disasters in the form of terrorist events are the focus of this research. This involves all kinds of activities and practices resulting from the intent of humans, their negligence, and challenges to cope with surrounding events or circumstances. For example, wars and the use of destructive weapons and the actions used by terrorists, as well as oil spills and electric blackouts, are the most destructive actions that could significantly threaten the natural and built environment.

Terrorism is directed towards urban forms and spaces for several reasons. The vulnerability, value and visibility of urban locations, spaces and infrastructure are considered the key factors that attract criminals to these site in order to commit different sorts of violent acts. Also, their elements effectively react and absorb “the impacts of national, regional and often internationally fuelled conflicts” (Beall, 2007; Findley et al., 2015).

The official and unofficial responses to coping with the impacts of man-made disasters (terrorism acts) also affect and complicate urban forms and facilities. Moreover, they restrict social activities and transform urban areas to military spaces. Graham (2011) shows in his book “Cities under Siege” that British attempts to deter terrorist acts by the use of a new technology e–border programme represents official responses to preventing the proposed or virtual threats before they happen. Graham confirms that the use of new surveillance systems was the first step towards militarizing urban spaces. The concept of urban militarization has been deepened by the use of the slogan “nation security” to deter terrorist acts. Jeffries (2013) shows that the national
security practices implemented in an attempt to deter terrorist acts transferred urban spaces to frontline spaces or sites of battle, for example, the so-called “War on Terror” in Iraq created theatres of war out of Iraqi cities.

The inequality and incoherence among urban residents due to social, cultural and religious factors are informal responses to an increase in the gaps, differences and conflicts which impact on urban forms and spaces. These responses increase urban divisions and create an atmosphere of fear. Gaffikin and Morrissey (2011) illustrate that urban splintering can be increasingly accelerated by socio-economic factors and social differences in “class, race, religious affiliation and ethnicity”.

Therefore, man-made events including terrorist acts and the official and unofficial responses are considered to be the major factors threatening urban forms and spaces. In this research, there will be a concentration on the impacts of these actions and reactions on urban form and residents’ behaviour in one of the world’s most terrorism-affected cities.

The research classifies urban planning responses resulting from terrorism acts in war-affected areas into two categories. The first is formal planning responses, which refers to all official measures and arrangements to cope with terrorist acts and insecure circumstances. The second represents the informal planning responses which involve the residents and social institutions’ responses. The impacts of terrorist acts and the prevention responses used are shown below.
2-2-1 Planning Responses to Terrorism

This section shows the impacts of terrorism and planning responses to the physical, economic, environmental and social aspects of an urban area.

Physical form elements

Urban form can be affected by terrorism and security measures through several elements including: urban morphology and landscape; density and land use; and infrastructure, as discussed below.

Urban morphology and landscape: Historically, several factors have participated in the configuration of the urban form and structure. Protection and security concerns were the main factors. They significantly contributed to the layout of safer and more secure forms and were the basis on which was created the concept of defensive spaces. Security concerns were also the impetus for strengthening the relationship among the forms of buildings and the surrounding spaces, and were effectively employed in the form and design of traditional buildings. Therefore, the concept of defensive spaces and the coordination among the buildings and spaces began in old cities. The concept of building coordination traditionally referred to different types of buildings arrangements, such as simple coordination, formality, monumentality, orthogonal layouts and geometric order (Smith & Michael, 2007).

The morphology of Baghdad’s circular city (one of the oldest cities in the world) represented a unique exploitation of design elements and space characteristics to provide defensive spaces. Baghdad’s round cityscape was surrounded by three fortified walls and four gates, with symmetric streets and geometric residential blocks, as well as functional divisions for designs elements, revealing that each part of this urban form’s component was directed to safety and protecting its residents. The security concerns and measures used to fortify the city remained the main characteristics in Baghdad even as the city expanded. Al-Hasani (2012) indicates that the new parts, which were expanded due to socio-economic factors, were still surrounded by walls and moats as shown in Figure 2-8.
The concept of defensive spaces and a fortification system was significantly employed in the design of Fort George, North Britain in 1752. This fort was successfully integrated with locational factors, such as orientation, and the situation of buildings as well as the topography of the land, see Figure 2-9 (Boyed & Linehan, 2013).

Figure 2-8: Baghdad morphology till the end of Abbasid Empire
Source: Al-hasani, 2012

Figure 2-9: A plan of Fort George, North Britain, 1752.
Source: Boyd & Linehan, 2013

Security and defence have traditionally been important factors in the formation of cities. Today many cities have experienced considerable changes in both morphology
and management due to security arrangements. For example, the morphological, and landscape elements have been increasingly supported by new defence strategies and security measures which were unfamiliar and not applicable in the past; these in turn included different methods to cope with the changing tactics of terrorists. In spite of the importance of these arrangements, their influence on urban form and space is not always appropriate. Coaffee (2003) suggests that the urban form and landscape became more complicated in both Belfast, Northern Ireland and London as a result of security arrangements and surveillance measures, see Figure 2-10.

In addition, these arrangements add real challenges to urban life and activities “Security is becoming more civic, urban, domestic and personal: security is coming home” (Coaffee & Rogers, 2008). Coaffee and Rogers argue that the terrorist attacks of September 11th 2001, and the resulting security arrangements, have affected the spatial planning of cities. In response to such terrorist acts, cities have created fortified spaces (rings of steel) and gated districts which fragment urban form. Moreover, these security responses create an atmosphere of fear and a culture of surveillance, as well as the militarisation of urban design.
The Belfast strategy to prevent terrorist attacks involved closing streets and restricting movement. These strategies were also adopted in London by zoning the city through a ring of steel, actually security cameras and sophisticated surveillance, which restricted the entrances and exits of the city, see Figures 2-11.

Moreover, the concept of a ring of steel is considered to be one of the most complicated security systems in the world; in addition to the use of a wall built of steel, it involves a network of cameras that provides a video record which covers about two and a half square kilometres of the city. Mullins (2006) shows in his article “Ring of steel - New York City gets to replicate London’s high security zone” that the effectiveness and efficiency of this concept in deterring the terrorist attacks was needed in the computing resources to operate within suspected or specified areas. These included lots of sophisticated security systems which continually connect the surveillance data from high-crime neighbourhoods with computerized records to data analysis, see Figure 2-12.

Moreover, the strategy of deterring terrorist attacks “crowding terror out” through the use of security measures and advanced systems has become part of a city’s components and has established the architecture of security in Beirut, Lebanon. Beirut was divided into several security zones or “hot spots”. Concrete walls, military tanks and vehicles, concrete and plastic cones and blocks, sandbags and barbed wire were considered the main architectural characteristics of the security of this city. These measures have affected the daily life of individuals and their practice of urban activities on many different levels, according to the residents’ social hierarchies and positions (Fawaz, Harb & Gharbieh, 2012) see figure 2-13.
Figure 2-11: Access restriction in the city of London
Source: (Coaffee, 2003)

Figure 2-12: the computerized systems used in the cities of London and New York
Source: Mullins, 2006
These mechanisms of security arrangements represented essential attempts to militarise urban spaces. Moreover, the spatial interventions and geography across the urban spaces and properties in some cities play a key role in creating contested frontiers, thereby increasing political conflicts and social differences among the residents of the same city, in turn increasing urban disorder. Bou Akar (2012) argues in his article “Contesting Beirut’s Frontiers” that the spatial interventions used in Beirut
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and in particular, Sahra Choueifat, is difficult to categorize, and was the main reason for the increase of political and social conflict in Beirut.

Density and land use: Land use and density are two other urban elements that can be significantly affected by terrorism acts. Marcuse (2006) found that the September 11th attacks and attendant consequences resulted in 2,825 deaths, 100,000 jobs being lost and 13.5 million square feet of office space destroyed. He argues that these consequences have affected the physical form by motivating decentralized activities, and the appearance of new barricaded residences around the city and surrounding suburbs in an effort to avoid the massive damage of September 11th. Furthermore, high-density buildings, particularly high-rise buildings, became undesirable after the attack.

Glaeser and Shapiro (2001) suggest that increasing proximity among people, as a result of fear during terrorist acts, makes cities more appealing to people, hence increases the density of urban areas. The reverse may be true during times of war, as people are encouraged to disperse in an effort to avoid the destruction of buildings and bridges, resulting in urban population dispersal. He indicates that modern warfare and terrorist acts that target infrastructure and services particularly increase the costs of travel between and within cities. This in turn increases density because people try to minimise commuting for work. So war and terrorist acts affect urban land use and density by increasing or decreasing population density.

Infrastructure: “If you want to destroy someone nowadays, you go after their infrastructure” (Graham, 2005). Infrastructure is an essential target for war and terrorist acts because one aim is to create urban disorder. “The future of warfare lies in the street, sewers, high-rise buildings, industrial parks, and the sprawl of houses, shacks, and shelters that form the broken cities of our world” (Graham, 2009). New strategies in warfare and terrorist acts are to affect invisible urban infrastructure and to cause disruption, completely disabling urban life as a whole (Graham, 2005). Graham indicates that unmonitored infrastructure is an easy target for terrorists, and he recommends that urban spaces and infrastructure should be consistently
monitored and that new security tools for insurgent surveillance should be developed. Others argue that these practices may deconstruct urban unity and form.

Obviously urban infrastructure can be easily affected by both terrorist acts and the local residents’ conflicts. The magnitude of damage and casualties that might result through attacks on urban infrastructure depends on the responses of individuals, planners and local authorities in coping with such events.

For example, restructuring the physical layout of urban form, and limiting the number of confusing streets and spaces in which all a stranger’s movements would be visible, is considered to be part of the solution, but not the ultimate solution. To increase effectiveness, these design elements must be integrated with advanced security software and web-based systems (Georg, Ray, & France, 2002). Mills and Huber (2002) emphasize the significance of the extension of airport-style security and surveillance systems to encompass entire cities and societies by using high-tech systems. They highlight that security measures should involve protecting infrastructure by tracking and targeting insurgents.

Technological monitoring of infrastructure and identifying insurgents has transformed cities into battle spaces. “The concept stresses the way in which every day urban sites and circulations continually telescope local into global. This process sustains an urbanization of military and security doctrine” (Graham, 2009). According to Graham’s vision, controlling urban planning and practice through ‘security’ requires transnational industrial complexes that fuse systems of safety programs (security and military) with modern technical systems. This allows urban sites and infrastructure to be easily monitored. Telecommunication infrastructure can play a significant role in discovering and preventing danger, and can help to decrease the magnitude of damage and accelerate the recovery (Smith & Simpson, 2009). The combination of new technology measures in surveillance and urban form elements has contributed to urban resilience. This resilience has been defined as an initial attempt to detect, prevent and handle the disruptive challenges that face urban spaces and daily life. This resilience encompasses policies for managing security services, for example restricting access to urban spaces, like gated communities, the surveillance in airports and
financial centres, or the security responsibilities that are dispersed throughout government (Coaffee & Wood, 2006). Supporting urban spaces and infrastructure both physically and managerially helps to achieve urban resilience. The effects of terrorism on urban infrastructure are dependent on the range of arrangements and adopted plans or policies. A number of countries that have experienced insecure conditions have explored the temporary effects and post-attack city growth as a reaction to the bombing of infrastructure. Garretsen, Schramm and Brakman, (2003) found that in affected cities in Germany, the productivity of cities had not been changed or influenced by changing the population size, or destruction of infrastructure. Both effects had a temporary impact on post-attack city growth. They proved that the main reason for accelerated development and growth was the cost of housing and construction before and after the attack.
Economic elements: Recent studies confirm that economic competition among the cities is one of the principal feature in shaping cities’ forms and structures. It is the reason for the appearance of “market-driven urbanity”, the urban scape controlled by capitalist operations’ pursuit of profitability rather than public officials, significantly contributing to shaping the neoliberal city (Bayat, 2012). Economic factors are considered as a channel to destroy the cities during times of insecurity and conflicts. This is what happened in Iraq and Iran, where the populations were collectively punished by the use of economic sanctions which adversely affected urban residents. This sector can influence or be influenced by insecure and conflict circumstances in different levels and phases. From an economic view, the consequences of conflict are incredibly high. “Economic behaviour [was] worst affected by conflict from 1960 to 1995” (Stewart, 2003). Economic behaviour during times of conflict can be understood through identifying economic aspects such as economic growth, export and import activities, governmental revenue, governmental expenditures, physical capital and investments, etc. The years after a war may see dramatic changes depending on the strategies and policies used to recover from the event. The following discussion presents economic interactions and responses to war and conflict.

Industrial capital: These facilities are often the main conflict and terrorism targets and can dramatically affect urban form. Murdoch (2002) says that since 1960, almost all attacks have been in developing countries, and the targeting of industrial capital has affected economic growth. Collier (1999) finds a GDP per capita decline of 2.2 percent during civil wars and the years following. This is not just because of reduced production capacity, but is also as a result of a loss of capital stock. Collier emphasized that post-conflict rebuilding of industrial capital enables the economy to grow rapidly. He found that after a 15-year war, the post-war growth rate was enhanced by 5.9% per annum.
Investments and market activity: The scale of an area’s fundamentals and its strength are considered the main way to measure the degree of spatial concentration of economic activity and investment direction. Moreover, the volatility of market activity can cause significant changes in the level of locational fundamentals, and hence in economic activity, possibly in capital investment, consumption and other business cycle variables (Schwert, 1990). A constant change in market activity is required to drive and motivate other types of urban activity. According to Schwert (1990), the insecure circumstances during the period after World War II saw a dramatic decrease in the volatility of the stock market. Both inflation rates and the monetary growth rate saw lower levels of volatility. These activities have played a big role in the fast post-attack recovery in both German and Japanese cities. Whereas the reverse may be true during the times of conflict, as a country’s capital stocks and bonds prices may see considerable fluctuations. For example, during 1930-1946, German government bonds fluctuated constantly which impacted the stock values (Waldenstrom & Frey, 2002) as shown in Figure 2-14.

As for other market activities, the construction market and housing investments were the main factors that helped West Germany to recover more quickly than East Germany. These investments reduced the differentiation among the population which accelerated city productivity and growth (Brakman, Garretsen, & Schramm, 2004). Evidence from cities which experienced catastrophic disasters, like New Orleans, shows that the reduction in housing supply after a hurricane was lower than the

![Figure 2-14: The fluctuations of government bonds during Germany’s frequent breakdowns.](source: Waldenstrom & Frey, 2002)
demand, so housing prices doubled compared to pre-disaster times. There was also a considerable reduction in the labour market and in workers’ wages, which increased unemployment (Vigdor, 2008). Likewise, after World War II, the distribution of economic activity, including random growth and locational fundamentals, increased a location’s efficiency and activity within Japanese cities and created variations in population density, so the post-disaster recovery in Japanese cities was faster (Davis & Weinstein, 2002).

As for war’s effects on the victorious countries, policy makers in America have discovered that in spite of military developments, their domestic economy declined constantly as a result of overspending on military protection and over-investment abroad to keep security (McCormick, 1995). The collective data from the countries which have faced wars indicates that there were increases in government expenditure on military purposes, and these were the direct reason for the destruction of a country’s industrial capital, see Figure 2-15.

![Figure 2-15: The size of defence spending in war-affected countries. Source: Stewart, 2004](image-url)
Environmental responses

Natural capital: This capital includes the stocks of environmental assets such as soil, atmosphere, forests, minerals, water and wetlands (Moser, 1998). The services of this capital are channels to sustain urban life and the wellbeing of future generations (Hinterberger et al., 1997).

These elements are considered the key factors that ensure the success and continuity of other capital and resources. The decisions by terrorists to attack the natural capital, or in other words, the environment, depend on the strategies and tactics that they use to achieve their goals. The following are some aspects of natural capital attacks.

Pollution as a result of attacking natural capital: Terrorists have begun to use the environment as a conduit for destruction, by using devastating weapons and releasing chemical or biological agents into the environment (Schofield, 1998). The terms environmental terrorism or environmental destruction refer to the “disruption of the environment through premeditated or inadvertent action” (Shwartz, 1998). Heger indicates in his article “Terrorist Attacks against the Natural Environment” that eco-terrorism and bioterrorism can occur through two channels; the first through polluting natural resources such as water, soil and air. The second is the destruction of infrastructure that secures human life against natural disasters, for example, dams and dikes. The abuse of environment elements and exploitation of them for destructive purposes, such as happened in Tokyo and Iraq, is a real evidence of the environmental implications that have occurred and may occur due to war and terrorism acts. Moreover, the pollution which is often released into the environment as a result of war-related activities, including the use of different kinds of weapons, cannot be tackled immediately post-war. This pollution affects the natural capital elements of air, water, soil and all creatures. (Al-Azzawi, 2006). Therefore in most of these attacks, industrial capital was not the main target - the focus was on human capital and life, as well as attacking the plants and animals.
Pollution as a result of the use of natural resources and mines as a weapon: Targeting the environment is the other face of terrorism. Environmental components have been threatening societies. A good example of this is the destruction of Vietnam’s forests by spraying Agent Orange to expose military supply lines, and in the process, doing widespread health and environmental damage (Schmitt, 1996). Likewise, environmental elements have been used as a means of controlling individuals’ decisions, as happened in Iraq during the period 1980-1990. Leaning (2000) says that the Second World War’s effects involved dike disruption, dam destruction, and scorched earth, which severely impacted the environment.

Policies in arranging and managing natural resources and mines during war have been the other main practice against the environment. For example, the First Gulf War of 1991 saw the use of different natural resources for defence by one side and for attack by the other side. The Iraqi Government used rivers around cities, mass barriers of soil as well as the burning of oil wells for protection. These processes were followed by the bombing of the tanks and oil wells by both the Iraqi and the occupying forces. These practices and the high humidity in the region caused acid rain which caused extreme pollution, affecting both the human and natural environment (Bako George et al., 1991).

Social responses
The social and political reflections that result from violence and terrorism may physically affect the urban form and life, and may take different shapes. It shifts urban space and daily life to a contested area, where social divisions are increased to serve the politicians’ interests or those who manoeuvre to serve their private interests.

Urban life has often been an arena where different aspirations and interests, often forged as specific ethnicities, fight it out in order to win spaces of manoeuvre or where an assortment of brokers and middlemen mediate between “state and slum”. (Simone & Fauzan, 2012)

The socio-political situation and the decline of central authority as a result of violence are other factors that can increase the gap between social categories. This can have a number of effects on urban elements; it leads to resource depletion and arbitrary land
allocation to supporters of the political regime in power, and to control of social resources (Allen, 1999). Thus, political interests in some countries increase social differentiation and add new challenges to urban form by weakening planning decisions. Although targeting the social domain (i.e., daily life, norms, religious rituals, symbolic traditions, attendance and participation in community institutions) acts of terrorism significantly affect urban form and individual behaviour, but strengthen social unity through increasing collaboration among residents. Fabiyi (2008) shows that although closing the neighbourhoods and spaces in Johannesburg and Ibadan for security and safety purposes weakens the social relationship and connectivity with outside communities, it does however increase the social ties within; hence increases the social cohesion and internal integration.

Participation in social and religious activities provides a means to consolidate individual and collective identity as well as to ensure civic behaviour. Social issues, such as health care, lack of public services, crime, household struggles, and social vulnerability can be resolved by increased participation (Gomez, 1999). This in turn will secure continued social contacts; therefore will decrease the effects of terrorist acts. Research shows that social contacts among households, family, community and society members in terrorism affected areas play a key role in reducing the impacts of terrorist acts. The social contacts and discussions about terrorist acts significantly contribute to an increase in individuals’ perception and awareness to cope with the threats before they happen, and contribute significantly to increasing the resilience of urban residents (Keenan & Hanson, 2013).

There are a number of studies showing that individuals, households, communities and societies can contribute in different ways to increase or decrease violence (The World Bank, Washington, 1999). Figure 2-16 illustrates an integrated framework for the causes of violence:-
Social elements can be targeted by violence and terrorism in different ways. A discussion of these elements (social and human capital) is provided below.

Social capital: Social capital is considered as a sphere involving all of people’s actions and participation in groups and institutions. “Social capital is an attribute of an individual in a social context. One can acquire social capital through purposeful actions and can transform social capital into conventional economic gains” (Bourdieu, 1986). It allows two types of interaction, the first is horizontal interactions that link individuals to each other, and strengthen families members, and the ties among different groups, and ensures social networks and civic engagement. The second is vertical interaction that involves the relationship between authorities and the requirements of daily life. Sustaining the integration among these interactions contributes to combatting social vulnerability and supressing violence, as well as increasing societal cohesiveness (Colletta & Cullen, 2000). Violence and conflict may be a reason for an increase in the intensity of social capital and may strengthen relations among people (Sobel, 2002).

Social relations and support for social activities and donations can be strengthened after a traumatic event. Americans, who witnessed the tragic events of 11 September 2001, became more helpful to one another and participated more in religious rituals. They shared their thoughts and feelings, and participated in activities such as vigils, which can provide a sense of community. They participated effectively in volunteer activities, helping people far away who have experienced tragedies. This has generated
intimate feelings among people, who cope with the aftermath of the attacks by trying to take constructive action in a time of uncertainty and helplessness (Schuster, Stein, & Jaycox, 2001). Individual relations and participation in groups and organizations as a result of violence and conflict are ways to improve better life and society quality. Whereas,

The decline of the quality of democracy and the quality of life are result of a dramatic decline in the level of participation in group activities, and this decline has far-reaching negative effects, from destabilizing democratic institutions, to lower effectiveness of schools, to reducing the magnitude of powerful forces that improve collective health and well-being. (Putnam, 1995)

Moreover, “The problem with a lack of commonality and attendant civility among neighbours, and even within families, is that their absence renders people incredibly vulnerable to criminals” (Newman, 2009).

The effectiveness and strength of social relations and institutional participation, as well as the nature of interpersonal interactions, significantly affects the efficiency and sustainability of development processes (Putman, 1993). Coleman (1988) indicates that social ties, norms and obligations among individuals both in families and communities, are useful channels to support social capital, hence human capital. He finds that closed social structures are more defensible and useful in protecting individuals than open social structures, and these structures concentrate on limiting the external negative effects and encouraging positive ones. These social ties and closed structures have been more effectively used in traditional urban forms than in contemporary ones.

Human capital: Human capital includes building and developing education and health levels, particularly nutrition, skills and education have been considered the main factors for employee performance (Moser, 1998). These factors can be significantly affected by terrorism and violence which ultimately affects employee productivity; this in turn can directly and indirectly affect urban form.
The prime components for increasing human capital are skills, education, expenditure and development programs (Schultz, 1961). Thus, keeping individuals secure from internal and external threats is very important to increasing their productivity. This has two main aspects; first, safety from serious threats and diseases; second, protection from destruction and disruption of daily life. There are seven significant security elements: economic, food, health, environmental, personal, community, and political (Paris, 2001). The “human security” concept aims to maximise people’s choices and options to access their daily needs and to minimize the effects of extreme threats. This is not just plans or arrangements but involves human rights, good governance and access to services as well as policies and strategies (Stewart, 2004). So insecure circumstances constrain human activities and freedoms and disrupt development. This capital involves the following, discussed below.

Physical/ mental health and population growth: There is a large body of literature on the impacts of post-traumatic events on human health and growth. Traumatic events have changed people’s lives, particularly those who have been attacked and affected by terrorism or who have faced health problems (Helgeson, Reynolds, & Tomich, 2006). They confirm that direct exposure to traumatic or adversarial growth makes the casualties less exposed to stress effects. The names that refer to these changes are “posttraumatic growth”, “stress-related growth”, “benefit finding” (Helgeson et al., 2006).

An empirical survey by McMillen, Smith, and Fisher, (1997) found several cases related to personal growth, which include being nicer, stronger and more spiritual and making changes in life priorities, all directly connected with the severity of an event. Moreover, it has included the relationships between the severity of exposure during an event and mental health status. The survey results have proved an increase of perceived benefit of post disaster, see Figure 2-17.

Areas that have experienced devastating wars and have had their populations decline have seen considerable development and more rapid post-attack growth rates than those which have not been impacted (Davis & Weinstein, 2002). For example, the bombing of Japanese cities shows that cities which have experienced a considerable
population decrease as a result of bombing recovered, and faced faster post-attack growth rates than others which had not been bombed. Figures 2-18, 2-19 illustrate the relationship.

Figure 2-17: an interaction of severity of exposure and perceived benefit on number of mental health diagnoses changed from time 1 to 3-year follow-up. Higher numbers on the y axis indicate more recovery.

Figure 2-18: Population growth in (Hiroshima and Nagasaki)

44
Vigdor (2008) confirms the post-attack recovery issue; he shows how almost all countries that have experienced catastrophic man-made disasters have witnessed an upward trend in their population growths in post-disaster periods.

**Individuals’ Responses.**

The effects of violence and terrorism can take one of two directions affecting an individuals’ post-violence behaviour. The first is trauma associated with violence and terrorism that affects individual identities, beliefs, behaviour. The second is trauma that motivates the victim to practice new social norms and/or participate in new social institutions (Bellows & Miguel 2009). The type and nature of trauma plays a critical role in shaping individual behaviour, it may strengthen the behaviour positively, or negatively.

Children who grow up and see their parents arrested or killed as a result of violence or internal causes (for example, tribal conflicts, drug abuse, bad treatment from society) will exhibit more antisocial behaviour than others (Murray & Farrington, 2012). This antisocial behaviour represents negative gained behaviour as a result of internal events. These children have been referred to as the “forgotten victims” of crime.
(Matteus, 1983). However, there are some external events or conflicts which may contribute to the unity of the people, making them more homogenous, and may affect their behaviour positively.

The positive changes which follow trauma and adversity (e.g. posttraumatic growth, stress-related growth, perceived benefit) are consistently associated with adversarial growth. Evidence proves that people who suffered and faced adversarial growth over time were more interactive and less distressed (Linley & Joseph, 2006). Moreover, the security conditions, the relationships and reactions are the other psychological cues that support individual behaviours and psychological gains and improve their security knowledge, hence increasing their options to cope with the surrounding environment (Zacharias, 1974).

Travel Behaviour: Individuals’ travel behaviour can be affected by the surrounding circumstances. For example, insecure circumstances including terrorist acts can add major challenges to urban daily activities and individuals’ travel behaviour. The fear of terrorism and the minimum practice of urban daily activities is one of the usual and known challenges. “A terrorist act is an act which aims to create a fearful state of mind in an audience different from the victims” (Ruby & Charles, 2002).

The review of literature on the terrorism and counter terrorism impacts on transportation confirms that terrorists target transport systems because this disrupts urban life and disables individual movement. For example, the terrorist attacks on general surface transportation and the airlines of the US, the UK, France, and Tokyo suggest a clear focus on transport systems and policies that should be depended upon to secure transport means (Jenkins & Gersten, 2001). The terrorist attacks on the U.S. navy ship in Yemen, the aircraft used in the 9/11 attacks in New York, Washington DC and Pennsylvania, trains targeted by terrorists in London and Madrid, and trucks targeted in Iraq confirm the importance of this sector.

Moreover, research shows that individual transportation behaviour was significantly affected by these attacks and "individuals, who felt personally threatened by terrorism, were expected to take or support actions that decreased their exposure to
terrorism" (Huddy et al., 2002). Glaeser and Shapiro (2001) argue in their report, “Cities and warfare: the impact of terrorism on an urban form”, that the continued attacks on transport infrastructure made travelling unsafe. They confirm that these attacks created chilling behaviour among individuals during their travel on the roads; hence they reduced their use of transport to avoid exposure to terrorism. The evidence from those who had experienced terrorism attacks and threats found that they were continually changing their travel modes, and had adopted new behaviour to protect themselves against terrorist acts. Gigerenzer and Gerd (2006) highlighted this point with the fact that prior to 9/11, a majority of Americans preferred to travel by air, but after 9/11 air travel dropped sharply. This resulted in an increased use of driving which caused a dramatic increase in the number of road accident deaths.

Likewise, contemporary security, concerned with the use of fortification elements and technological methods to cope with terrorist acts and protect transportation infrastructure, also affects individual behaviour because it tends to restrict free movement, flexibility and route choice. Coaffee (2003) describes the security measures used in Belfast, Northern Ireland which included concrete barriers, rings of steel and gated fences that divide the city centre into seven separate zones with only two vehicle entrances. Movement of cars and parking is restricted to only two car parking areas, which significantly affects transport behaviour. Moreover, these measures created an “atmosphere of fear” that had consequences for social control and freedom of movement (Coaffee, 2008).

Education: Access to education facilities for both students and teachers is an important way to sustain human capital by increasing individual skill levels. Violence and conflict that targets schools aim to undermine the capacity for participating in daily life. “Conflict among neighbours family conflicts or scandals, the presence of gangs, neighbourhood drug use, and prostitution activities in the neighbourhood - had a significant effect on school dropout rates” (Knaul, 1999). School dropout rates are also associated with domestic violence, abuse, or the presence of alcohol or drug use within the family.
Other researchers have confirmed that declines in educational levels can be associated with the destruction of physical capital (schools) as a result of war. The destruction through damaged schools, frightened pupils and their families, and absent teachers not only affects education levels, but impacts upon household structure and income (Justino, 2010). The effects of war and violence on education levels vary. Articles indicate that these effects depend on school levels (primary or secondary) and the magnitude of the violence. Empirical surveys undertaken by specialists have found that individuals who are facing violence or civil war are more likely to interrupt their secondary education rather than their primary education (Akresh & Dewalque, 2008; Swee, 2009). Meanwhile, the average recovery rate for primary schools in war-affected regions is higher than secondary schools, even those from non-affected areas (Loayza & Querol, 2007). In addition to a difference in war effects on schools, it has significant effects on the gender ratios in the schools. The exposure to conflict often has a negative impact on household incomes and hence on their ability to send girls to schools (Shemyakina, 2006).

An individual’s education is a significant factor that can be integrated with technology instruments to support physical capital and economic growth. “The human capital affects growth through two mechanisms. First, its levels directly influence the rate of domestically produced technological innovation; and second, it affects the speed of adoption of technology from abroad” (Benhabib & Spiegel, 1994).

2-3 Impacts of Urban Governance and Non-Governmental Organisations on Urban form, Terrorism and Counter Terrorism and Daily life during Insecure Circumstances

Research highlights that the urban governance and non-governmental organisations can contribute positively in sustaining urban forms and daily life through minimizing the acts of terrorism, crime and conflict, as shown below.

2-3-1 Urban Governance

“Governance” refers to all kinds of collective activity which are used within urban spaces to manage and arrange public interest and shared places. This also involves the management of economic activity, sociocultural life and political activity. The structure
and context of urban governance is not constant, for example, its requirements in normal circumstances differ from those in the circumstances of insecurity and spread of disease. Keil and Ali (2007) argue in their article “Governing the sick city”, that more attention should be given to new emerging threats and diseases within urban metropolitan areas, and these should be integrated with social cohesion and economic competitiveness to make the structure and regulation of urban governance more comprehensive in dealing with future threats. They emphasize the role of specific works and professional arrangements which were used by municipal institutes in creating a shared space which ensured a constant interaction between local healthcare modes and regulations with civil society and economy representatives, hence, making the prevention and protection measures used against threats and disease easier.

In some countries, the variety and difference in the activities used and planning controls within urban areas, shift urban governance from informal collective activity to formal government governance. This in turn contrasts with new trends of urban governance. The integration of urban policies including multiple actors other than the public sector is an efficient way to empower the whole society and ensure strong partnerships among public and private organization (Andersen & Van Kempen, 2003). This policy moves urban management from government to governance structures, and creates a shared zone in managing urban spaces and facilities. Hence, it outlines a framework for urban governance that should be dependent upon government and citizens for its development, and thereby should enhance the quality of urban life (Healey, 2010).

Healey argues that controlling and delivering collective action programmes has three spheres: formal government, civil society, and economy, representing the best way to make better urban places and the best solution for the challenges of future planning problems. According to Healey, the institutional dynamics of management have a key role in structuring and shaping planning projects. The role of institutions in urban governance and development are significantly confirmed by Jon Pierre (1999) in his article “Models of Urban Governance: The Institutional Dimension of Urban Politics”. According to Jon Pierre, the wide range of institutional responses and urban politics can significantly shape varied kinds of urban governance models and creates four
general models: managerial, corporatist, pro-growth, and welfare governance. The atmosphere that collects and exploits these models of urban society is called the urban regime. This in turn concentrates on two main topics; the first involves urban government which depends on political structures in governing the local state, whereas the second includes urban governance which guides local society to achieve their collectively objectives (Pierre, Jon, 2005). Therefore, urban governance involves and integrates the participation of both official (government) and unofficial (local citizens) in decision making and configuring urban daily life; hence “building democratic and functional governing structures at the neighbourhood and metropolitan levels” (Warren et al., 1992). This will create a shared zone which collects official and unofficial responses as a collaborative and protective zone that protects urban daily life and activities. Urban control and legislation is one of urban governance’s main tools, as shown below.

**Urban Control and Legislation**: In contemporary urban life both legislation and urban regulations are considered the main part of urban governance; it reflects the values and importance of local governments and their residents. Oakerson and Parks (1989) indicate that urban governance in most developed countries can best be understood through the constitutions of local governments (regulations and legislations) which ensure and secure the relationship between officials and citizens.

Urban control and legislation can play a key role in the outlining of urban planning projects and the anticipated problems, configuring the guidelines that shape the urban environment. They contribute significantly to sustaining urban life through creating a safe and secure environment.

Recent studies show that urban legislation and regulation can be directed successfully to minimizing the effects of criminal and terrorist activities. For example, the latest issue of crime prevention through environmental design confirms this direction, highlighting the importance of improving practical legislation and policies that take into consideration crime and safety issues and reflect the privacy of each community. According to the above mentioned issue, the most safe and secure designs against criminal attack are the designs that have obvious guidelines which position the
experiences and practices of professional planners, designers, and decision makers with relevant planning controls and make them easy to implement in real life (Jonathan, 2013). Jonathan (2013) indicates that the best channel to create crime prevention design is by balancing professional development and planning controls. The need for new guidelines and planning controls, as well as legislation in deterring external terrorist acts, has been continually updated. For example, Michael Brooke (2013) through his commentary on the role of design in reducing crime aspects highlights that the residences built with secured design standards (planning controls and legislation) are 75% less likely to be penetrated by criminals compared with those which are built with non-secured, by design standards. He emphasis the significance of best understanding and combining the layout of external spaces in the initial design stages; access, permeability, lighting, defensible spaces, surveillance and car parking, as well as physical security requirements such as details of doors, windows and power sockets. This in turn can contribute effectively to providing easy and safe access for residents and supports the concept of crime prevention through environmental design. Therefore, the success of any design in deterring crime and in unstable security circumstances is evaluated by the strategy adopted and policy used. These strategies emanate from robust planning controls and legislation and reflect local residents’ needs and social requirements. In his article “What constitutes success? A critical review of the practice and implementation of Crime Prevention through Environmental design in New Zealand” Chris Butler (2013) indicates that the success of any design is embedded in adopting strategy and using policy that enables local authorities’ participation and which reinforces social guardianship. He highlights that encouraging local councils and societies to use their own crime reduction strategies (planning controls) can play a significant role in increasing public awareness of crime prevention, hence, will create more attractive and safer designs. For example, Maraenui shopping centre project in New Zealand represents a new approach to design that reflects the local communities’ needs, rather than using a technical approach which is far from the local residences’ environment, therefore ensuring social support for public spaces and the built environment.
The Canterbury earthquake in the south island of New Zealand is another example of the impact of crime prevention through environmental design on community recovery in the aftermath of disaster. Ramsay (2013) illustrates that after the earthquake which devastated Christchurch in 2010, the city council and Christchurch interagency groups adopted a safer strategy through establishing National Guidelines for Crime Prevention through Environmental Design. These guidelines and relative parts have been supported by the government through the funding of many training programs and safety workshops which enable residents to cope with unsafe circumstances. Both urban specialists (architects, planners, and decision makers) and security professionals (officers, police, and private companies) have been involved in drawing up the guidelines.

2-3-2 Non-Governmental Responses (NGOs)

Non-governmental organizations’ responses refer to the activities provided by civil society–dependent organizations or community-based sectors or other independent social sectors. Historically they have been in existence since 1839, and there were 1,083 NGOs at the beginning of the 20th century. They played a key role in reducing conflict and building peace worldwide, besides providing a range of activities and support. In Nigeria for example, NGOs participated effectively in determining the effects of a destructive civil war, and legislated the principles of peace (Uzuegbunam, 2013).

Since 1947 the role of NGOs has become well-known, particularly after the establishment of the United Nations (UN). The second half of the 20th century witnessed an expansion of NGOs’ roles which were linked with the UN and were the beginning of appearance of international non-governmental organizations.

The category of NGO involves a range of organizations, and their activities provide a range of programmes from conflict management, mediation, and peacekeeping, human rights, aid (financial and moral) to security cooperation organizations, etc. The impact of regional organizations in the aftermath of the Cold War increased significantly and they were most active in Africa and Europe. Also, their role in
mediation and peacekeeping has increased considerably since 1947, as shown in Tables 2-1 and 2-2 below (Diehl and Cho, 2005).

Table 2-1: The involvement of UN and regional organizations: 1947-1995

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Source: Diehl & Cho, 2005

An objective of many NGOs is to encourage people to participate significantly in development and social change during a specific period, something which cannot be achieved through governmental programs. Almukhtar (2014) indicates that in spite of the ethnicity and religious division which deepened strongly in Baghdad city after the events of 2003 when coalition forces moved into the city, the community-based initiatives which were increasingly dependent on groups of residents participated successfully in rebuilding the social fabric and involvement in the social redevelopment of Baghdad.

Almukhtar (2014) shows three case study groups that were employed in Baghdad which depended on local residents. These groups were Fikra space, Sada, and GoPhast. The first was to provide a collaborating space for people interested in sharing ideas, resources, contributions and knowledge. The second, Sada, was directed towards Iraqi
artists, to create a space that sustained local art and practices. Sada was a non-profit organization dependent on volunteers. The third group, GoPhast, was interested in dealing with Baghdad’s traffic problems. They used mobile-based applications to support their daily transport journey by detecting and broadcasting information about blocked or closed streets and traffic jams.

2-4 Conclusions

It is apparent from the review of literature that the planning responses in terrorist affected areas differ according to the nature of threats and the magnitude of damage and casualties. Terrorism and counter terrorism constitute great challenges for daily life and urban form. They influence urban form through two channels; the first is direct devastation of the components of urban form and structures, while the second is through indirect disruption of social, economic and environmental capital.

Regarding the physical form responses that are part of formal responses, the research highlights that the urban form can play a significant role during times of insecurity. It can shape individual behaviour from a social point of view through controlling people’s activities and restricting their intents. Meanwhile, urban form can be influenced by social behaviour during the practice of daily activities.

Likewise, from an economic point of view, urban form can be largely affected by centralised or decentralised economic activities. These activities sprawl and assemble the urban forms and structures in a way that suits the functional objectives on one hand, and the security concerns on the other hand. It is also clear from the research that security concerns have great impacts on environmental components as they have been increasingly focused.

The range of issues and topics used in research such as “Form follows fear”, “Defensive spaces”, “Battle spaces”, “Crime prevention through environmental design”, and “City of fear” confirm the public’s concerns. They reveal the practices and security measures taken, as well as providing recommendations for stakeholders to cope with terrorism acts.
The research is divided into two groups with each having supporters and detractors. The first group involves Oscar Newman and colleagues; they adopt the concept of ‘natural surveillance’ which suggests that the open spaces, and space elements as well as fortification systems are natural defensive systems that can play an effective role in deterring terrorist acts. The second group includes Graham and colleagues; they encourage ‘a mechanical surveillance’ by using new technological systems and techniques in controlling the urban spaces through the use of cameras and gated barriers (rings of steel). In spite of sharing the same aims of counter-terrorism and damage minimization, the two groups suggest differing strategies and views.

Overall, it is obvious from the studies on terrorism and its implications, that the researchers coped with common sorts of terrorist acts which have occurred worldwide without giving more consideration to what happens in greatly affected areas.

Moreover, the research has poorly approached the impacts of security measures and safety arrangements used by both official and unofficial institutions on the built environment (urban forms) and conversely the impacts of the urban forms on official and unofficial responses in terrorist affected areas. The prior research has concentrated increasingly on technical methods and computer-based solutions rather than the solutions that are embodied in some urban forms and their structural components.

A review of the research on terrorism’s influence on urban forms and spaces highlights two points. First, there is very little discussion and a clear gap in the literature on how terrorism and related security measures affect urban forms and spaces, as well as urban daily activities. “Urban space will always remain less knowable and, thus, less controllable than the restricted panoptic space” (Graham, 2011). Second, almost no research has been conducted in high-risk areas because of unstable security and a lack of reliable information sources. Savitch (2008) indicated that the lack of security/safety as well as restricted data sources and accuracy made him exclude countries like Iraq from his research.
Therefore, this research can significantly contribute to the knowledge through concentrating on urban planning responses in extreme terrorist affected areas. This will fill the gap in the research which is absent from the literature. In the meantime, this study examines and compares the ways in which different urban forms and structures can influence and be influenced by terrorism acts and counter-terrorism measures. This will assist in identifying the distinctive urban characteristics that may contribute to preventing or minimizing terrorist acts.
Chapter 3: Description of the Case Study Areas

This chapter has two parts; the first focuses on Baghdad and provides: 1) an historical background; 2) a discussion of urban governance; 3) a review of urban transformation and master plans; and 4) a location and definition of Baghdad’s green zone. The second part contains a description of the three case study areas within Baghdad and examines: 1) the criteria used to select them; 2) their boundaries and distinctive features; 3) relevant planning regulations and design guidelines; and 4) evidence of terrorist activity.

3-1 Baghdad

Baghdad is the capital of the Republic of Iraq, and is the nation’s centre of commercial and administration activities. With a population of 7,837,963 (Iraq Census 2015), it is the second most populous Arab city after Cairo, Egypt. It has over seventy neighbourhoods, nine administrative districts. These districts originally represent the main sectors of Baghdad city.

In 2007 (the peak of insecure and terror events), Iraq government incorporated with US Military commandos have developed and designated new structural plan called Baghdad Security Plan to secure Baghdad’s districts. This plan involved allocating one security centre (who control and be responsible for each district). Therefore, ten security districts were established as a result of the rise in security concerns (Kagan, 2007).

3-1-1 Historical Background

Archaeological records show that in ancient times, the city of Uruk, now known as Warka, was the largest settlement in Mesopotamia. Founded in 3500 BC and situated about 250 kilometres south of Baghdad, Uruk is considered to be the world’s first city, the city in which urban life in Mesopotamia began. The founding of Uruk led to the civilization of the country which is known today as Iraq. Key features of early population centres were defensive elements in the form of fortified walls, towers and ditches to protect residents from external threats. Defensive features were almost universal for cities during this period (Coaffee, 2003). Baghdad’s circular city (767-946
AD) is an example, which was constructed over four years (762-766 AD) and was surrounded by three defensive walls and four gated paths, as shown in Figure 3.1.

Figure 3-1: Baghdad’s circular city 767-946 AD (the fortification systems and defensive walls)

Source: Lassner, 1968

In addition to its capital status, Baghdad is also the administrative centre of Iraq, being located in the geographic centre of the country, with a dominant economic and political role. The historical and contemporary importance of Baghdad is one of the reasons that it has been the target of terrorist attacks. Between June 2006 and June 2013 about half of Iraq’s terrorist acts have occurred in Baghdad (Washington Post, 2013). “Certainly, Baghdad has long suffered disproportionately compared with most other parts of Iraq in respect to level of violence, degree of political resentment, and quality of life” (Agnew et al. 2008). This background provides the rationale for selecting Baghdad as the setting for this research.

3-1-2 Urban Governance in Baghdad

The concept of urban governance and building of urban institutions within Baghdad began in 1868 when Amanat Baghdad was established to manage, plan, control and regulate urban land uses during the reign of the Ottoman Empire. These rules were
known as the Ottoman Municipalities’ regulations. Amanat Baghdad was a service district that contained three municipalities. In 1931, the name, Amanat Baghdad, was changed to Amanat Al-Asimah, and planning controls and regulations were replaced by new ones. Amanat Al-Asimah was integrated and controlled by the Iraqi Internal Ministry until 1958. The Iraq Development Board was formed as the official planning department to layout strategies and policies, as well as to consult with urban planners (Pyla, 2008; Amanat Baghdad, 2012). Since 1987, many changes have occurred in Baghdad with some cities and districts leaving the city and others being added. The other change involved changing the name from Amanat Al-Asimah back to its pre-1931 name Amanat Baghdad, and locating it administratively within the Secretariat of Ministers’ Council. This system of urban governance and structure for Baghdad has remained unchanged since 1987.

3-1-3 Urban Transformation and Suggested Master Plans for Baghdad City

3-1-3-1 Urban Transformation

Baghdad was the result of the expansion of Al-Mansur’s city in the 8th century A.D, and attracted a growing population. Baghdad has experienced considerable changes during its history, some of which were related to external factors such as invasions. For example, Baghdad had disappeared completely in the 14th century A.D due to Mongol invasions (Gulick, 1967). However it subsequently experienced a rapid transformation due to population growth. Baghdad’s Round City started to take a rectangular shape and it expanded beyond the walls in the 17th, 18th and 19th centuries as shown in Figure 3-2 (Al-hasani, 2012). Moreover, there were two major changes during the last century: the first between the 1920 and the 1940 when the population grew to over 500,000. To accommodate this growth the city expanded towards the northwest and southeast. The second major change occurred in 1950s with the establishment of the Iraq Development Board, which built dams, irrigation, schools, hospitals and public buildings (Pyla, 2008).
Al-hasani note that the expansion of Baghdad in 17th and 18th centuries helped define one part of the city’s form which is identified by its four gates: Kulwatha; Muatham; Wistani; and Talsam. The 19th century expansion helped to give the city more structure by creating homogeneity and coordinated hierarchy among spaces.
Initial attempts to develop a master plan for Baghdad began in 1936 with German consultant Breeks Wibrozwener, who was chosen to provide a plan to accommodate 500,000 people in the city. This plan was not implemented because it did not match with the projected population (was too small to accommodate rapid population growth and displacement from surrounding cities due to economic factors) (Amanat Baghdad, 2012).

During the latter half of the 20th century, four master plans were prepared between 1954 and 1984 by consultants from four different countries: English consultants Minoprio and Macfarlane in 1954; Greek consultants Doxiades in 1958; Polish consultants Paul Service during 1965-1973; and finally Japanese consultants GCCF in 1984. The plan which was prepared by Paul Service was officially implemented because it was issued and supported by the Iraqi law.

**The Minoprio and Macfarlane Plan 1954**

This master plan proposed to connect the road system of Baghdad’s core with new bridges across the Tigris River, and the plan applied principles of zoning. In this design, Baghdad took a circular shape with a diameter of approximately 18 kilometres, with diagonal streets directed towards the city centre. The city was surrounded with a nine kilometre wide green belt, and a dam to prevent flooding of the low-lying portions of the city.
This plan included eight districts (four on each side of the river), each containing 18 mahalla (neighbourhoods), designed to accommodate 10,000 people. Thus, each district could accommodate 180,000 people for a total population of 1.5 million people (Amanat Baghdad, 2012). Therefore, the growth of city’s services and facilities which followed the population growth was the main reason to develop this plan.

Figure 3-4: Minoprio and Macfarlane Baghdad Plan (1956)
Source: AmanatBaghdad, 2012

The Doxiadis Plan 1958
The second plan for Baghdad was initiated by the Iraq Development Board when they chose Doxiadis to prepare a new plan for Baghdad, taking into account the work done in 1956 by Minoprio and MacFarlane. Preparing a plan for an old, historic city like Baghdad was difficult; therefore, Doxiadis used a number of special strategies such as uniformity and regularity to redevelop the existing city into a modern and symbolic one. The Doxiadis Plan was considerably different from the 1956 Minoprio and Macfarlane Plan, as it was provided for a much bigger city – about 2.5 times bigger than the previous plan, as shown below in Figure 3-5.
This design was of a rectangle shape with straight perpendicular streets and dimensions of 18 kilometres by 31 kilometres. It was planned to accommodate three million people in five districts each with 14 mahalla (neighbourhoods). The design gave significant importance to the banks of the Tigris River and suggested three irrigation channels, one of which, the Army channel, was built in 1960 (Pyla, 2008). Population growth and economic factors (agricultural and tourism) were the main motivations for preparing this plan.

The Doxiadis Plan also provided detailed designs for buildings and units within the residential sectors. The logical separation of functions between residential sectors, and even each sector’s components, was a key factor in creating a dynamic plan for
Baghdad. The scheme of western residential sectors in Baghdad succeeded in accommodating seven to ten thousand people due to the functional distribution of services and facilities (see Figures 3-6 and 3-7)

Figure 3-6: Plan of Community Sector in West Baghdad (Doxiadis Archives)  
Source: Pyla, 2008

Figure 3-7: Community Sector Model for West Baghdad (Sector 10, Slide 9601)  
Source: Pyla, 2008
Urban Form and Insecurity: A case study of three districts in Baghdad

The Paul Service Plan 1965 to 1973

This planning effort began in 1965 when Amanat Baghdad commissioned Paul Service to prepare a 1990 plan for Baghdad. The plan encompassed two parts: 1) general and detailed plans based on fieldwork surveys; and 2) documents on the implementation conditions, legislation and regulations and construction rules for each phase. Therefore, this plan was a semi-comprehensive aimed at solving the problems in the previous plans. The Plan is shown below in Figure 3-8. Some key aspects of the Paul Service Plan included:

- The formation of a six person committee to supervise and implement the design. Three of these people were experts in the field of urban planning, the others were concerned with economic, social, and legal issues.
- Specification of implementation phases – the first phase was to be finished in 1974. It was recommended that the plan be updated every five years.
- Details of the first phase, as well as detailed district designs, were provided at both the general and detailed scales, including specifics on housing (including multi-story buildings), industry, trade, transportation and public facilities.
- The plan was prepared to accommodate 3.5 to 4 million people.
- The plan attempted to solve traffic congestion problems with the construction of new streets and highways, such as the Mohammad Alkasim highway.

While this plan made a number of improvements over previous plans, officials found that the Paul Service Plan lacked urban details and did not include three-dimensional perspectives for the city centre and secondary centres, as well as other important places such as industrial areas, conservation areas, and entertainment and leisure areas (Amanat Baghdad, 2012).

The GCCF Plan 1984

Amanat Baghdad commissioned GCCF in 1984 to develop and update Baghdad’s comprehensive plan for 2015. The main objective of this plan was to develop a comprehensive plan that considered population growth as well as all social, economic, and historic factors. The Plan is shown in Figure 3-8. Progress on the implementation for this plan was interrupted by the First Gulf War in 1990. The company submitted three main reports – each is described below.
- The first report provided a regional analysis of population, employment, resources, properties and policies regarding agricultural, industrial and community settlements.
- The second report examined Baghdad in detail including its population, economy, old and modern scenarios, expected problems and proposed solutions, physical problems (particularly for suburbs and city’s edges external and internal borders), city structure, infrastructure and legislation.
- The third report provided strategies for each phase of the project, including implementation policies as well as investment strategies and sources of funding (Amanat Baghdad, 2012).

Figure 3-8: GCCF Plan (1984)
Source: Amanat Baghdad, 2012
3-2 Baghdad’s Green Zone

The green zone is the centre of the city and is the location of the residences of Iraq’s president and prime minister, as well as the home of the Iraq Parliament. The zone contains the majority of governmental ministries as well as many international embassies, including the US embassy which is considered the biggest embassy in the Middle East.

Figure 3-9: Green Zone in Baghdad
Source: Google Maps with annotations by the author

3-3 Case Study Areas

Within Baghdad, three areas have been selected for analysis: the district of Rusafa; the district of Falastin; and the Haifa district. Hereafter the three case study areas will be referred to as Rusafa, Falastin and Haifa. See Figure 3-9 for their locations within Baghdad.

3-3-1 Criteria Used to Select Case Study Areas

Four criteria were used to select the case study areas.
1- Diversity in urban form and structure. Each of the three selected areas is different in terms of urban form/structure. Rusafa has a traditional compact form and low-rise structures, while Haifa is modern with high-rise structures, and Falastin has mixed urban form with aspects of the traditional and modern.

2- Diversity in building design and materials. Buildings in each of the districts have been constructed using different designs and materials. Rusafa was built with bricks, and housing design is directed inward around courtyards. Haifa's buildings use pre-cast concrete and focus outward in their design. Falastin has a mix of building designs and materials.

3- Proximity. The adjacency of the case study areas is another important factor as they are all in close proximity to one another, with two located on the Rusafa side of the Tigris River and one on the Karkh side.

4- Terrorism activity. A key factor in selecting the case study areas was to find three districts that were similarly affected by terrorist acts. As is illustrated below, all of the case study areas have experienced numerous terrorist acts.

3-3-2 Boundaries of the Case Study Areas and their Populations

The first area, Rusafa, is located in the centre of Baghdad and extends along the Tigris River for 4,000 metres. Rusafa’s 2007 population was estimated to be 164,119 (Iraqi Central Census, 2007). It is bounded on the southwest by the Tigris River, on the northeast by the Mohammad Al-kasm highway, on the northwest by the Bab Al-Moazam Bridge and on the southeast by Al-Tahreer intersection, as shown in Figure 3-10).

The second area is Falestin, which is located northeast of Rusafa and is a part of the New Baghdad district. The 2007 population for the New Baghdad district, which includes Falestin, was 870,462 in 2007 (Iraqi Central Census, 2007). It is bounded on the southwest by the Mohammed Al-Kasm highway (which it shares with Rusafa), on the northeast by the highway of the Army Channel, on the northwest by Mustansiriya Square (Safi Al Din Al Hilli Street), and on the southeast by Al Maysaloon Square (see Figure 3-10).

The third area, Haifa, is located on the opposite side of the Tigris River from the other two case study areas. The 2007 population estimate for Kharh district, which includes
Haifa, was 139,079 (Iraqi Central Census, 2007). Haifa district is bounded on the northeast by the Tigris River, on the southeast by Al Nasr Street, on the southwest by Shaik Maruf Street, and on the northwest by Shehab Square (see Figure 3-10).

![Figure 3-10: Case study areas](image)

Source: Google map with edits provided by the author

3-3-3 Distinctive Features of the Case Study Areas

While the case study areas are comparable in many respects, each has a number of distinctive elements that are described below.

1- Rusafa

Rusafa is one of the oldest urban centres in the world. It is historically connected to the erection of the round city of Baghdad in about 754-775. A description of its distinctive features follows.

Urban form and location features: Rusafa’s urban form, represented through its compact urban form, contains traditional types of Al-Baghdadi houses and alleys and constitutes a convenient environment in which to live and work, particularly during
Urban Form and Insecurity: A case study of three districts in Baghdad

harsh weather (Figure 3-11). Rusafa’s buildings are designed so that they are directed inward around a central courtyard. As this district is located in the heart of Baghdad, it has a strategic role as a transport centre. The presence of historical buildings such as the Al-Moustansirya school, Abasi Palace, Baghdadi Museum, AlQishla (alarm clock), the old defence ministry, Saray Sq, Marjan Kan, the Museum of Pioneers and Artists, and the Place of Culture and Arts adds to its strategic importance in Baghdad (Figure 3-12).

**Land uses, and structural features:** Rusafa has a mix of land uses that produces an active urban environment. Most of Rusafa’s land is devoted to commercial, residential (mixed use), or local craft making. The area is compact, with four main streets lined with two-story buildings.

**Social and cultural features:** Rusafa is well known for its unique social and cultural places and streets. The presence of Abu Nuwas Street, Al-Rashid Street, and Al-Motanabbee Street, and cafes and public libraries has made Rusafa one of the key social and cultural centres of the region (Figure 3-12).

**Economic and administrative features:** Rusafa is considered to be at the heart of Iraq’s commercial activities. Its strategic location adjacent to the Tigris River, network of roads, and mixture of skilled and unskilled workers are the primary reasons for its dominant economic role. In addition, the presence of the Ministries of Higher Education, Industry and Minerals signals its importance as an administrative centre as well (Figure 3-12).
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Figure 3-11: Rusafa’s urban form, traditional streets and alleys
Source: Rusafa Summary Report, 1984

The historical and heritage places

The social and cultural streets

The official buildings and ministries

Figure 3-12: Rusafa’s distinctive historical buildings, cultural streets and government ministries
Source: Photos taken by the author

2- Falestín
Falestin is another of Baghdad’s distinctive districts. Running through the area is Falestin Street, one of the most important and longest streets in Baghdad. The development in Falestin began in the early 1960’s. The district contains a range of features as described below.

**Urban form and locational features:** Falestin has a mix of both traditional and modern forms. The design of buildings in this district simulate the traditional design, but with the use of modern methods and concepts (Figure 3-13). The district contains a number of important residential neighbourhoods including Falestin; Robayee; Al-mustansiriya; Idrissi; Nile; and Al-Zayouna (Figure 3-14). Each has unique and distinctive features in terms of type of residents, size of property and construction dates. The district is surrounded by two highways, the Mohammed Al-Kasm and the Channel of Army, providing good accessibility and strategic links with surrounding districts.

![Figure 3-13: Falestin’s urban form and building designs](source: Photos taken by the author)

**Land use and structural features:** Falestin has a variety of land uses, including residential, commercial, educational and public use. The commercial and public uses extend along Falestin Street and within the Green Zone for some public use. The
structure of the district is semi-open with reticular planning. The buildings in this district are primarily two-story for residential purposes and multi-level for commercial use.

**Social and cultural features:** Falestin is one of the main social and entertainment centres in Baghdad. Its buildings are well known as places for holding formal and informal ceremonies. Its role as a social and entertainment centre has been enhanced by the construction of social and entertainment clubs, such as Generals’ Entertainment, Air Force as well as the presence of the Iraqi House for Fashion. As for cultural features, the district contains Al-Mustansiriya University, Al-Rafideen College (a teacher training institute) and a highly regarded secondary school (Figure 3-14).

![Figure 3-14: Falestin’s neighbourhoods and buildings](image)

Source: Google map with annotations by the author

**Economic and administrative features:** The district’s economic value is confirmed by the presence of Falestin Street – one of the key commercial streets in Baghdad. The district’s administrative importance is due to the presence of official buildings and ministries, including the Ministries of Oil, Transportation, Water Resources and Interior. In addition, the official directorates, including the Military Survey, General Traffic, Housing and College of Police are located in Falestin (Figure 3-15).
3- Haifa

Haifa is located across the Tigris River from Rusafa. As with the other case study areas, it has a number of distinctive characteristics, and contains both traditional and modern forms.

**Urban form and locational features:** Parts of this area, such as those along Haifa Street, have been built with modern forms (Figure 3-16), using new concepts such as an outward focus. There are eight unique sections along Al-Haifa Street, with each section’s design representing a particular event. Some parts represent Iraqi historical icons and others embody Al-Baghdadi house (Alshanashil). All of these sections share features of Iraqi traditional streets in their use of arcades, but have a modern appearance. Figure 3-17 illustrates these sections.

**Land uses, and structural features:** The dominant land use in the district is residential followed by public spaces and services (Figure 3-17). The structure of the district is completely different from Rusafa and Falestin. For the first time, multi-story buildings and pre-cast construction were used.
Social and cultural features: There are a number of traditional zones within the district (Figure 3-18). These zones have located behind and along Haifa Street and are considered heritage conservation zones (Amanat Al Assima & Alousi Associates, 1980-1985). Representative photos of this area are provided in Figure 3-18.
Figure 3-18: Locations of traditional conserved buildings

**Economic and Administrative features:** Haifa is the new administrative centre of Iraq. It contains many government buildings including the Ministries of Finance, Municipalities, Justice and Tourism. Being close to the centre of decision making in the Green Zone has helped to increase its administrative role. Haifa has also emerged as the centre of tourist offices and private corporations. Figure 3-18 shows the location of these official buildings.

It is obvious that each case study area is different. The following table shows the comparison among the case study areas.
Table 3-1: Comparison of Case Study Areas

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Rusafa</th>
<th>Falestin</th>
<th>Haifa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban form</td>
<td>Traditional</td>
<td>Mixed</td>
<td>Modern</td>
</tr>
<tr>
<td>Land Use</td>
<td>Traditional (mixed use) and local crafts</td>
<td>The main uses are residential, commercial and educational. The public use extends along and behind Green Zone</td>
<td>The majority is residential followed by public use and services</td>
</tr>
<tr>
<td>Building Height</td>
<td>The average is two to three levels</td>
<td>The average is two levels for residential use and greater than two for commercial</td>
<td>Multi-story ranging from 5 to 16 levels for Haifa Street and two levels for the traditional streets</td>
</tr>
<tr>
<td>Building materials</td>
<td>Brick</td>
<td>Brick, stone and concrete. Mosaic stone used for finishes</td>
<td>Pre-cast concrete for building structures and finishes for Haifa Street buildings. Brick for traditional streets</td>
</tr>
<tr>
<td>Building design</td>
<td>Traditional forms with inward orientation for rooms and functions (courtyards)</td>
<td>Both modern and traditional designs were used, as well as use of special shapes and sizes for interior functions and windows</td>
<td>Modern concepts with outward orientation</td>
</tr>
<tr>
<td>Population Background</td>
<td>Residents are skilled and unskilled workers with low to moderate incomes</td>
<td>Residents are educated (lawyers, teachers, and generals) as well as merchants with high incomes</td>
<td>Government supported and institutional staff with moderate to high incomes</td>
</tr>
<tr>
<td>Age</td>
<td>End of the 19th century</td>
<td>Beginning of 1960s</td>
<td>Haifa Street in the 1980s and the traditional parts in the 1900s</td>
</tr>
<tr>
<td>Building Condition</td>
<td>Moderate to bad condition</td>
<td>Good to very good condition</td>
<td>Modern parts are in very good condition</td>
</tr>
</tbody>
</table>
3-3-4 Planning Regulations and Design Guidelines in the Case Study Areas

3-3-4-1 Planning Regulations

The Iraqi system of roads and construction dates back to the Baghdad planning regulations, instituted in 1935. According to this system, Baghdad’s districts are classified into the following types:

First Class Regions: This class contains all the old and traditional districts. Section 46 of the rules confirms that the width of roads in this class should not be less than 4 metres and Section 47 requires that the lot size should not be less than 100 square metres (sqm).

Second Class Regions: Section 46 of the rule requires that the width of roads in this class should not be less than 8 metres and Section 47 require that the lot size should not be less than 200 sqm. Both Rusafa and Old Karkh (which contain parts of Haifa Street) are classified as either first or second-class regions.

Third Class Regions: Section 51 of the rule requires that the width of roads in this class should not be less than 10 metres and section 52 shows that the lot size should not be less than 300 sqm and the width must be 15 metres.

Fourth Class Regions: Most of the new districts are in these regions. Section 51 of the rule requires that the width of roads should not be less than 12 metres, and Section 52 states that lot sizes should not be less than 600 sqm, with a width not being less than 20 metres. Buildings in this region are limited to 60% of the lot size. The Falestin district contains portions of both Third and Fourth Class regions.

Special Class Regions: This class includes all special regions and housing projects. Road width cannot be less than 15 metres and lot sizes not less than 2,000 sqm, with widths not less than 25 metres. Building footprints in this region are limited to 30% of the lot size. Haifa Street is located within this class.

Section 25 of the rule allows cantilevers to be used in fourth and special class regions on one condition; it must extend no more than four metres from the property.
boundary in a fourth class region and five metres in a special class region. The edges of new buildings must be the same distances as noted above (four metres in fourth class and five metres in special class). According to Section 30, housing cannot be constructed from wood.

3-3-4-2 Urban Structure and Design

Because of the dates of development as well as the district classes and regulations, each district is different in terms of design and building materials. The following provides a short description of the types of structures, designs and materials in each of the case study areas.

3-3-4-2-1 Rusafa: This district has four distinctive streets – three are traditional (Al-Rashid, Al-Kefah, and Al-Sheik Omer) and one is modern (Al-Kulafa). Figure 3-19 provides a map of Rusafa showing the main streets. Figure 3-20 provides details of the design of the buildings and arcades along one of the district’s main streets – Al-Rashid Street.

Figure 3-19: Map of Rusafa showing the main streets
Source: Amanat Baghdad
A fieldwork survey was done in August 2004 by a team of planners from Amanat Baghdad (Amanat Alassima, 2004). They found that there were 229 buildings along Al-Rashid Street. Some of their key findings are discussed below.

Floor numbers: Forty of the 229 buildings were one story, 86 were two stories, 68 three stories, 18 were four stories and 20 were five stories. Only three properties had no buildings.

Building status: About one third of the buildings were in good condition, another third were in moderate condition and the remaining third were in bad condition.

Building materials: Eighty-one percent of the buildings were brick, about half of these materials were covered with cement, whereas 4.4% and 6.6% of the buildings were built with concrete structures and steel, respectively.

Heritage value: The survey found that 70.2% of the buildings were invaluable in terms of the heritage principles, whereas 19.7% of the building were heritage buildings, the rest were partially heritage. The pie charts below illustrate what is mentioned above in 1 and 2.
Figure 3-21: pie charts show building materials, and floor numbers of traditional buildings
Source: Fieldwork survey by Amanat Alassima, 2004

3-3-4-2-2 Falestin: The district is divided into two parts by the Green Zone. This zone contains general buildings and ministries. Falestin Street extends through the district from north to the south and divides it in two parts. The first part contains four neighbourhoods: Mustansiriya; Hayy 14 July; Nile; and Almuhandsen. The second part involves the neighbourhood of the old and new Zayouna and Robayee. Figure 3-22 shows the neighbourhood's two parts.
The majority of the buildings along Falestin Street are three to four level commercial buildings. Reinforced concrete, which was filled with concrete blocks, was used largely in the structure of these buildings. Modern materials, such as aluminium sheets and screen blocks were used in their finishing (Figure 3-23). Moreover, there was difference in the size of properties among the district’s neighbourhoods. The structure and size of properties, as well as the finishing materials used in the neighbourhoods, varied in Almuhandseen, Idrissi, Nile, and Mustansiriya (see Figure 3-23).

The property size in Almuhandsen, Idrissi, and Nile neighbourhoods is 600 sqm, whereas the size of properties in parts of Mustansiriya and Hay 14 July neighbourhoods within the district’s first part is 400 sqm. As for the second part of the district, the size of Zayouna property is 600 sqm.
3-3-4-2-3 Haifa: This district has both traditional and modern structures. Because of the district size and the availability of data and information, there will be a concentration on Al-Haifa Street to show the contrast with Al-Rashid Street within the Old Rusafa district. The buildings along Al-Haifa Street with their modern designs and materials are well known. They are classified into eight sections according to the construction companies, with each one having different designs. Figure 3-24 provides a map showing the design of buildings fronting Al-Haifa Street.

Section One residential units have been divided into two types, units of three bedrooms and two bedrooms. There are 111 three bedroom units, whereas the number of two bedroom units is 51 (Amanat Alassima). Representation photos of this section are shown in Figure 3-25 below.
Section Two. This part contains (118) three bedroom units and (46) two bedroom units.

Section Three. There are 231 three bedroom units in the area, and 77 two bedroom units (Amanat Alassima). Figure 3-26 provides some photos of this section.

Section Four: The number of three bedroom units in this area is 222, whereas there are just 10 two bedroom units.

Section Five: This area involves official institutes such as Financial Control, S.O.F.T, the tourist centre, Rafidain Bank, the post office, Iraqi Airways, Baghdad Health Department, private clinics, and private offices (Amanat Alassima). Figure 3-27 provides some representative photos of this area.
Section Six: This area is the densest and has the highest number of units among Al-Haifa street’s parts. It contains 377 three bedroom units and 140 two bedroom units.

Section Seven: This section includes government ministries such as the Ministry of Justice and Local Government (Amanat Alassima)

Section Eight: This section contains 270 three bedroom units and 270 two bedroom units, as shown in the photos below.

3-3-5 Evidence of Terrorist Activity

This section focuses on the war and terrorist attacks which occurred between 2003 and 2012 in the three case study areas to show the nature, targets and the methods used to disrupt infrastructure and urban life. While the war obviously affected urban life, terrorist acts also had significant impacts on people and infrastructure.

Terrorists used different methods and devices to disrupt daily life and to increase the magnitude of damage and casualties. They attacked using car bombs, suicide car bombs, suicide vests and snipers, as well as grenades and other small arms (Petraeus, 2007).
Figure 3-29 show the size and number of attacks in the case study areas. Unfortunately the graph and map do not include all terrorist attacks – only those that were reported by the Western media.

![Map showing terrorist attacks in Baghdad](image)

Figure 3-29: the magnitude of terrorist attacks and incidents in the case study areas

The map shows that Rusafa appears to have suffered the most attacks of the three study areas, followed by Haifa then Falestin in terms of the number and size of attacks. The targets of these attacks were different, and the attackers used different methods to impact on urban life and facilities. Petraeus (2007) indicated that the majority of attacks in Iraq have been directed toward infrastructure and governmental facilities, with civilians being secondary targets. Trends in terms of number of type of attacks against Iraq are shown in Figure 3-30, and for Baghdad in Figure 3-31.
Urban Form and Insecurity: A case study of three districts in Baghdad

Figure 3-30: Number and type of terrorist attacks in Iraq 2004-2007
Source: Petraeus, 2007

Figure 3-31: Number and type of terrorist attacks in Baghdad 2006-2007
Source: Petraeus, 2007
3-3-5-1 Type of Terrorist Attacks in Case Study Areas

Table 3-2: Type of terrorist attacks 2006-2012

<table>
<thead>
<tr>
<th>Type of Terrorist Attacks 2006-2013</th>
<th>Rusafa</th>
<th>Falestin</th>
<th>Haifa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Car bombings</strong></td>
<td>Three car bombing/2006 One car bombing/2007</td>
<td>One car bombing/2006 Three car bombings/2007</td>
<td>One car bombing/2012</td>
</tr>
<tr>
<td><strong>Suicide bombings</strong></td>
<td>Two suicide bombings/2008 One suicide bombing/2010</td>
<td>One suicide bombing/2008</td>
<td>three suicide bombings/2008</td>
</tr>
<tr>
<td><strong>Suicide Car bombing</strong></td>
<td>One car bombing/2012</td>
<td>One car bombing/2009</td>
<td>Three car bombings/2009</td>
</tr>
<tr>
<td><strong>Bomb detonations</strong></td>
<td>Three bomb detonations/2007</td>
<td>Several bomb detonations/2012</td>
<td>Seven bomb detonations/2010</td>
</tr>
</tbody>
</table>

It is obvious from Table 3-2 that terrorists have used different methods to attack the case study areas. They have used car bombs, and suicide car bombs. The difference between the two attacks is that the first occurs by the detonation of cars parked beside the road, or near or in overcrowded markets. The second method was carried out by suicide drivers, who detonated cars in overcrowded areas.

Regarding the other methods (suicide bombings and bomb detonations), these attacks also differ from each other. Suicide bombings have been carried out by bombers wearing explosive devices that have infiltrated a crowd, whereas bomb detonations have been carried out by the use of special explosive devices.
3-4 Conclusions

Baghdad has a range of distinctive features that are the reason for its dominant role as the Iraqi capital. These factors represent its historical situation as a base and source of urbanism in the region. This dominant role has been created by several socio-economic factors and the successful urban governance which was first used in the region. Baghdad’s strategic location and connection with other cities on one hand, and its residents’ social and cultural backgrounds on the other, are valuable elements which have enriched its social and economic role.

The second part of this chapter focused on the three case study areas. It showed their geographical locations and boundaries as well as their distinctive features. Each case study area has its own unique character and differs from the other case study areas. These features are the neighbourhood’s urban form, land uses, social, economic, cultural and administrative factors. Also, the varied urban legislation and regulations, as well as the design used in each case study area, were presented.

Three urban forms and structures were highlighted in this chapter. The traditional form with its compact structure is represented by Rusafa; a mixed form with semi open and reticular planning is seen in Falestin; the modern form with open and high-rise buildings is used in Haifa.

The evidence of terrorist attacks within the case study areas was also reported in this chapter. Continuous terrorist attacks in the case study areas are evidence of the importance of these neighbourhoods. Terrorists have significantly affected the case study areas by their use of different methods and devices such as remote car bombs, suicide car bombs and the use of suicide bombers.
Chapter 4: Research Design and Methodology

4-1 Introduction

This chapter provides the logical steps and methods undertaken to achieve the research objectives. It discusses the arrangements and measures used to collect the data, including the methodology and the strategies used in the process of data collection and analysis. The chapter consists of seven parts: research questions; methodology; data collection; data analysis; safety and ethical considerations; limitations; and conclusions.

4-2 Research Questions

This section contains questions which focus on the urban planning responses in war affected cities. These questions were aimed at identifying three main points; the first is to identify the relationship between urban forms and the behaviour of those who live within these forms. The second focuses on terrorism and counter terrorism aspects and their impact on urban forms and residents’ behaviour. The third concentrates on the role of urban controls and legislation in war affected areas. Therefore, to achieve these aims the research, poses three main research questions, as shown below.

1- How does urban form affect, and is affected by, human behaviour?
2- How do terrorism and counter terrorism affect, and are affected by, urban form, controls and human behaviour in war affected areas?
3- How do urban controls and legislation affect terrorism and counter terrorism in war affected areas?

4-3 Methodology

The research uses a case study approach for several reasons. It places the research in touch with the event or case to be investigated, thereby giving valuable insights into the event and its relationship with others. Hodkinson, P., and Hodkinson, H., (2001) reveal that the case study approach can lead to a deep understanding of complex inter-relationships, this in turn will facilitate the building up of comprehensive details about the cases that should be studied. It is a common approach in social science to discover complex events and phenomena such as individuals’ life cycles and their
behaviours (Yin, 2013; Booth, Norton & Steer, 2012). Also, it is less restrictive in terms of giving more options to cope with the events. Finally, it is a good way to investigate topics which cannot be easily examined by the use of other methodologies, or cases which have unclear boundaries within their contexts (Baxter & Jack, 2008).

In this thesis, a mixed method approach was used, combining qualitative and quantitative methods for data collection as well as analysis. The mix-method approach is increasingly being used in social and health research and is frequently used in other research studies as well because they tend to support each other in terms of the results (Bernard, 2011). This is due to the fact that it gives wide scope to the research by using multiple stages for data collection. It also effectively encourages those with limited language skills to participate. Finally, it helps to provide more accurate results and restricts researcher assumptions (Bulsara, 2014).

The mixed method approach integrates both quantitative and qualitative collected data at specific stages of the research in order to better understand the research problems that cannot be sufficiently understood by the use of quantitative or qualitative methods separately (Ivankova, Creswell & Stick, 2006; Esterhuizen & Martins, 2015). This is because each method has distinctive tools that differ from each other in their structure, language, and objectives.

The qualitative method based on interviews is widely used in social science investigations. It is estimated that the majority of research results are based on the data collected through interviews (Nunkoosing, 2005). This method is increasingly used to explore the “inner experiences” of participants; how they feel and what they do, and to discover the relevant variables that can affect their behaviour (Corbin & Strauss, 2014). It contributes significantly, providing valuable details of complex and unexpected phenomena through a better understanding of behavioural aspects based on specific situations (Luton, 2015). Qualitative methods can be classified into three categories – structured, semi-structured, and unstructured interviews, according to the types of questions involved. These may be directed at exploring in depth specific events based on the experiences and backgrounds of particular participants (Gill, Stewart, Treasure & Chadwick, 2008).
In this research, the interview is directed towards skilled and professional people (architects and urban planners) who have specific knowledge, and who have witnessed urban form transformations in case study areas during the periods of insecurity. This in turn, has a key role to play in enriching the research with significant urban form related issues and valuable data which cannot otherwise be collected. Also, these professional participants can make a considerable contribution to more effective, clear and straightforward data collection in a short period of time to achieve the research objectives.

Quantitative methods on the other hand, are used to investigate a wide range of features or events in detail, and this method involves a large number of participants (Denscombe, 2014). This research strategy is described as being one which depends considerably on numerical data, and takes a distinctive epistemological and ontological position dealing with realities in social life, not simply numbers (Bryman & Bell, 2015). It involves the steps that employ measurement “focus on quantification” in data collection and analysis, and uses a deductive approach to test the theories and their relationship to the research (Bryman, 2012).

The research was carried out in Baghdad, a city which has witnessed significant acts of terrorism. This city is divided into two areas by the Tigris River, Karkh and Rusafa. Three case study neighbourhoods have been selected within these two areas. Two neighbourhoods are in Rusafa and one is in Karkh. While all of these neighbourhoods have been impacted by war and terrorism and are socially and culturally diverse, they have different urban forms and structures. The rationale behind the selection of these case study areas, as well as detailed descriptions, is provided in Chapter 3.

4-4 Data Collection Methods

Data for this research was collected from three primary sources: document review, a survey questionnaire and interviews. Two types of research methods (qualitative and quantitative) were used within the study areas to collect data.
The use of traditional quantitative and qualitative methods during the process of data collection was not easy, nor was it safe in a war affected area. For example, because of Baghdad’s unstable security conditions, standard survey protocols could not be used. Credibility and trustworthiness were of critical importance in conducting the fieldwork, so special techniques were used to simplify the data collection process. For example, the distribution of the survey questionnaire, the researcher employed the assistance of two people from within each district. The questionnaires were distributed on a Friday, a holy day in the Islamic faith, and the recommendations from the imams of each districts’ mosques provided credibility. These imams, or sheiks, have very high standing in their communities, and they encouraged those attending prayers to participate in the study.

The mukhtars, or community leaders, introduced the research team to the local residents in each district, thereby creating trustworthy links. These community leaders are held in the highest regard and they greatly assisted in the process of finding participants for the study, whilst also helping to ensure participation and data accuracy.

A letter of assistance and a recommendation supported by the Urban Planning Directorate increased the credibility of the project (see Appendix C). This letter actively encouraged the participants to support the questionnaire survey and made the process of data collection easier. The local urban planner’s assistance was a trustworthiness factor, as he oriented the research team, guided them to more accurate sources and increased data quality.

**4-4-1 Document Review**

In conducting this part of the thesis, the researcher scheduled regular visits to a number of directorates to locate the necessary information and relevant documents. The majority of information about the study areas was taken from the Municipalities of Amanat Baghdad, the Urban Planning and Census Directorates, as well as the official directorate websites. In addition, the researcher used personal contacts of those working in relevant directorates to source documents. This data collection step was done in advance of other fieldwork activities described below.
4-4-2 Survey Questionnaires

For part of this research, a survey was used to help provide answers to the research questions. This method was used in this case because it: 1) protects the security and safety of both researcher and participants; 2) ensures the highest number of participants in a limited period of time to avoid exposure to a terrorism threat; and 3) provides detailed information about what happened to those who have experienced war and terrorist acts.

The questionnaires were distributed to the participants during Friday prayers, in order to reach a high number of people who might be prepared to participate in the survey. The distribution took place outside of four mosques, two in the centre of Rusafa, and one in each Falestin and Haifa district (see figure 4-1). The survey team was directed by the researcher and included three assistants who helped to distribute and collect the questionnaires.

About 350 questionnaires were distributed to participants in October 2012. The number of completed questionnaires across the three case study areas was 281. The survey had 28 questions, as shown in Appendix A, which were classified into four categories.

The first category involved the collection of personal information. This included a number of questions about household members, the status of families, whether families also included grandparents, and the number of families living at the same house.

The second category focused on how residents coped with the war and terrorist acts. Moreover, it concentrated on the changes in the urban form after 2003. It included questions about how individuals defended themselves and protected their environment, as well as how they accommodated the increase in population density as a result of safety and security concerns. There were also questions that aimed to identify how the design of houses changed during the war and its aftermath. These questions inquired about the methods used to accommodate the increase in
household sizes and the protective measures used to protect the houses against acts of terrorism. The questions aimed at identifying which type of house designs were more sustainable and stable, and which were more flexible in terms of responding to surrounding events.

The third category examined individual behaviour during the war and its aftermath. It contained questions about individuals' shopping behaviour, the mode of transport used, the access to health and electricity services, and the management of daily activities. It also included questions about individuals' outdoor behaviour in terms of meeting friends and relatives, the places they meet, the daily routines and the routes used to get to work or school, and the use and parking of private cars. The aim of these questions was to compare individuals' behaviour within different urban forms to identify the differences, and to illustrate how these behaviours affected the urban forms. They also aimed to highlight which of these urban forms had been least affected.

The fourth category included questions about the effects of war and terrorism on urban forms and structures. It also involved questions relevant to the security measures and the safety arrangements used to cope with war and terrorism, and how these security measures affected daily movement. There were also questions about the status of buildings and the urban form, as well as the daily activity patterns within the case study neighbourhoods.
4-4-3 Interviews

In addition to the questionnaire, interviews were also conducted. The researcher contacted a range of possible interviewees to first obtain their permission to conduct an interview and then to set a time to meet. The participants were selected based on their knowledge of and experience in: 1) the building designs used in case study areas; and 2) the consequences of war and terrorism on design and urban form. The interviews were conducted throughout September and November of 2012 with twenty urban planners, architects and other professionals from the government and private sectors. All those interviewed were residents of Baghdad – fifteen of the interviewees were male and five were female.
Prior to conducting the interviews, the researcher had several meetings with urban planning academics at Baghdad University to refine the format and structure of the interview questions. The interviews focused on four broad questions (see Appendix B) aimed at identifying the status and changes in urban form resulting from war and terrorism. Those selected for interviews were professionals and academics involved in understanding the relationships between terrorism and urban form and structure.

The interview questions were focused on determining the most significant changes in the building form and design in Baghdad since 2003, with the goal of identifying what changes had resulted from war or terrorist acts.

4-5 Data Analysis
The questionnaire data was analysed using SPSS. This program was used to provide basic descriptive statistics and chi-square analysis to assess whether differences in survey responses across the three case study areas were statistically significant.

For the thematic analysis of the interviews with urban planners, architects and other professionals, Microsoft Excel was used to identify shared themes and/or concepts from the responses and for data analysis. The answers provided by the interviewees were then classified into a number of options, as shown in Appendix B. Qualitative approaches were used during the interview process for data collection and analysis of the urban planners and architects. Face-to-face interviews involved asking both semi-structured (open-ended) and focused (close-ended) questions. This method was effective and flexible in that it gave interviewees more opportunities to ask questions and to probe beyond the initial questions.

4-6 Safety and Ethical Considerations
With regard to ethical considerations, the research received an ethics clearance from Griffith University prior to the fieldwork and data collection process.
Regarding safety measures, the researcher was provided with a support letter from the Urban Planning Directorate in Baghdad to facilitate the process of data collection (see Appendix C). Further measures were taken to insure participants’ safety. The participants were volunteers and were free to reject participation in the project. Furthermore they were not asked for their names or addresses on the questionnaire. The presence of the Sheik and Al Mukhtar was used to assist in recruiting participants, and also helped to insure their safety and security. The participants were given the option of taking the questionnaire home and returning it on the following Friday. This was done for two reasons – the first was for safety in order to avoid gathering data in front of the mosques, which could expose the participants to terrorist attacks. The second was to get more detailed and accurate information by involving other family members. The researcher provided his email address and contact details to allow for continued connection with the participants should they have any follow-up questions or concerns.

4-7 Limitations

There were a number of limitations that should be noted, with security concerns being the main challenge. Terrorist activity and unstable security conditions increased governmental measures to secure the civilian targets which restricted the fieldwork. In addition, the interviewees in some of the government directorates could not participate in the interviews for security reasons, and some of those who did agree to be interviewed did not want to be recorded.

Therefore, getting official permission prior conducting the fieldwork survey was the main priority. Meanwhile, the supporting letter from the Urban Planning Directorate was critical in obtaining high levels of participation in the survey and to enable photographs to be taken.

4-8 Conclusions

In conclusion, three methods were used to collect data. The first involved a review of relevant documents, the second was a survey questionnaire and the third were interviews with key professionals. The survey and interviews were directed towards
specific targets and contained questions about urban form and individual behaviour. These questions were distributed to the residents of three Baghdad neighbourhoods which had experienced war and acts of terrorism. The research was designed to take into account all ethical considerations and aspects of trustworthiness during the process of data collection. For example, a support letter and the use of mosques were the main aspects of ethical consideration that were used in the survey. The fact that the researcher was accompanied by Al Mukhtar (a well-respected person in the community), and the recommendation by the Sheik of the local mosques considerably helped in gaining the trust of the participants. Qualitative and quantitative methods, mixed methods, and a thematic analysis have been used in the analysis of the collected data. These methods have been used to make comparisons between the responses of the residents’ responses living in three varied urban districts. The process of data collection (questionnaires and interviews) was not easy in a city affected by war and terrorist attacks, therefore, the researcher organized scheduled contacts with relevant professionals (architects and urban planners) and local residents, as well as obtaining official permission prior to data collection. These measures were considered to be ethical, trustworthy arrangements which greatly reinforced the security of the research team and the participants, and contributed significantly to the credibility and accuracy of collected data.
Chapter 5: Research Results

This chapter is organized around the research aims and questions and is divided into four sections: 1) urban form and human behaviour; 2) individual behaviour and the responses to terrorism and counter-terrorism measures; 3) the impact of terrorism and counter-terrorism measures on urban infrastructure and daily life; and 4) the collaborative domain between urban planners and security experts.

As mentioned previously, the research results are based on three main data sources: fieldwork and document review; a questionnaire; and interviews. For the fieldwork and document review, the results are categorized into two groups. The first are formal responses resulting from governmental and institutional reactions and arrangements to protect and secure the urban environment. The formal responses are collected in a review of documents, photos, and tours of the case study areas. The second arrangements focus on informal responses as determined by: 1) individual patterns of daily activities and behaviours to cope with insecure circumstances; and 2) the responses and actions of the non-governmental organisation sector.

The second source of research results comes from a survey. The results of the survey include two parts: the first are descriptive statistics including general characteristics, transport, and daily activities; the second is a chi-square analysis to identify whether there is a significant relationship among the variables.

The third source of data used in this chapter is interviews, which shows the results of the interviewees’ responses. It includes the results of four interview questions outlined separately.

Following are the sections which integrate the research aims and questions and show the research results.
5-1 Urban Form and Human Behaviour

This section focuses on how different urban forms can create different behavioural responses. It attempts to answer the research questions “How does urban form affect human behaviour and does human behaviour affect urban form?”

This first section examines the quantitative data collected across the three case study areas, and describes them in a simple form by using SPSS. The results from the survey indicate that urban form in the three case study areas affected, and was affected, by individual behavioural responses. A number of survey questions ask about the conditions which have been in existence since 2003. This year was selected because it was the year of the downfall of Saddam Hussein and the beginning of terrorism activities in the three case study areas.

5-1-1 Shopping Behaviour

Within Rusafa, about 48% of respondents indicated that they preferred shopping at the main district centre, compared to 41% in Falestin and 31% in Haifa. Meanwhile, 50% of Falestin’s, 35% of Rusafa’s and 22% of Haifa’s respondents preferred shopping at the closest commercial centre. Shopping at the other centres was preferred by 45% of Haifa respondents, 17% of Rusafa’s respondents and 9.5% of Falestin’s respondents see Table 5-1.

5-1-2 Car Ownership and Use

About 54% of Rusafa respondents indicated that they owned one car, whereas the results were 31% for Falestin and 48% for Haifa. About 65% of Falestin respondents indicated that they owned two cars compared to 42% in Rusafa and 43% in Haifa. The tendency to own three or more cars was similar across all three areas – less than 10% see Table 5-2.

In Rusafa, only 3% of respondents indicated that they used a car for shopping or conducting personal business, whereas the percentage was almost 16% in Falestin and 12% in Haifa, see Table 5-3. Rusafa’s respondents had the lowest level of car ownership and also the least tendency to use a car for their daily activities and shopping. This was reversed in Falestin, where respondents had the highest tendency to own two cars and to use them for daily activities and shopping. Respondents in Haifa showed similar characteristics to those in Falestin.
Table 5-1: Preferred Shopping Location

<table>
<thead>
<tr>
<th></th>
<th>Falestin</th>
<th></th>
<th>Haifa</th>
<th></th>
<th>Rusafa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
</tr>
<tr>
<td>District Centre</td>
<td>34</td>
<td>40.5</td>
<td>36</td>
<td>31.0</td>
<td>39</td>
<td>48.1</td>
</tr>
<tr>
<td>Nearby Centre</td>
<td>42</td>
<td>50.0</td>
<td>25</td>
<td>21.6</td>
<td>28</td>
<td>34.6</td>
</tr>
<tr>
<td>Other Districts</td>
<td>8</td>
<td>9.5</td>
<td>52</td>
<td>44.8</td>
<td>14</td>
<td>17.3</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>100.0</td>
<td>113</td>
<td>97.4</td>
<td>81</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Chi-Square test to check for significant differences in the preferred shopping areas

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>46.236</td>
<td>10</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>47.862</td>
<td>10</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>281</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is clear from the chi-square result that there is a significant relationship in the preferred shopping area across the case study areas.

Table 5-2: Number of Cars Owned

<table>
<thead>
<tr>
<th></th>
<th>Falestin</th>
<th></th>
<th>Haifa</th>
<th></th>
<th>Rusafa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
</tr>
<tr>
<td>One</td>
<td>26</td>
<td>31.3</td>
<td>55</td>
<td>48.2</td>
<td>38</td>
<td>53.5</td>
</tr>
<tr>
<td>Two</td>
<td>54</td>
<td>65.1</td>
<td>49</td>
<td>43.0</td>
<td>30</td>
<td>42.3</td>
</tr>
<tr>
<td>Three or more</td>
<td>3</td>
<td>3.6</td>
<td>10</td>
<td>8.8</td>
<td>3</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>100.0</td>
<td>114</td>
<td>100</td>
<td>71</td>
<td>100</td>
</tr>
</tbody>
</table>
Chi-Square test to check for significant differences in the number of cars owned

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>13.314</td>
<td>4</td>
<td>.010</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>13.300</td>
<td>4</td>
<td>.010</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>268</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The test shows that there is a significant relationship among the case study areas and the number of cars owned, as the test result (.01) shows less than the significance level 0.05.

Table 5-3: Mode of travel

<table>
<thead>
<tr>
<th></th>
<th>Falestin</th>
<th></th>
<th>Haifa</th>
<th></th>
<th>Rusafa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
</tr>
<tr>
<td>Walking</td>
<td>19</td>
<td>22.6</td>
<td>20</td>
<td>17.2</td>
<td>39</td>
<td>48.1</td>
</tr>
<tr>
<td>Bus or Minibus</td>
<td>14</td>
<td>16.7</td>
<td>35</td>
<td>30.2</td>
<td>16</td>
<td>19.8</td>
</tr>
<tr>
<td>Car</td>
<td>13</td>
<td>15.5</td>
<td>14</td>
<td>12.1</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1.7</td>
<td>3</td>
<td>3.7</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>54.8</td>
<td>71</td>
<td>61.2</td>
<td>60</td>
<td>74.1</td>
</tr>
</tbody>
</table>

Chi-Square -test to check for significant difference in the mode of travel

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>36.809</td>
<td>8</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>38.508</td>
<td>8</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>281</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is clear from the chi-square result that there is a significant relationship in the mode of travel used and case study areas.
5-2 Behavioural Responses to Terrorism

This section focuses on individual responses to cope with terrorist acts, and involves all adopted safety arrangements and behaviour. It shows how those who are living in terrorism affected areas with different urban forms respond to terrorism. Also, it shows how terrorism and counter-terrorism affect, and are affected by, urban form and controls and human behaviour, based on the results which are shown below.

5-2-1 Demographics

The size of families was similar across the three districts with the majority of families having four or more members. In terms of household size, a majority (56%) of Haifa households were one family. In Rusafa a similar percentage (58%) was two family households and in Falestin a majority (83%) were also two family households (see Table 5-4). In addition, approximately 70% of respondents indicate that they lived with their parents, and this was similar across the three case study areas.

In order to accommodate multiple families and the increase in the household size, houses/units had to be altered. The methods varied across the case study areas with 77% of respondents in Haifa indicating that they repartitioned interior spaces (converted the external balconies into interior spaces) compared to Rusafa where 34% of the respondents indicating that they repartitioned their space, and 30% added a new flat. In Falestin, 26% of respondents added a new flat and 51% converted the garden into a living space (see Table 5-5).

5-2-2 Housing

A majority of respondents owned their home with home ownership being somewhat lower in Haifa (60%) compared to Rusafa (76%) and Falestin (80%) see Table 5-6.

Since 2003, 86% of respondents in Haifa indicated that buildings had changed (been affected) in their neighbourhood compared to 63% in Falestin and 39% in Rusafa. Residents were also asked whether any buildings had collapsed or had been evacuated in their districts. There was a wide disparity in responses with 86% of respondents in Haifa stating that this had occurred in their district, particularly following the events of 2006, compared to 44% of respondents in Falestin and 39% in Rusafa.
5-2-3 Scheduling of Daily Activities

In Falestin, 24% of the respondents preferred to schedule their daily activities hourly, whereas this was the case for 15% of Rusafa respondents and 40% of respondents in Haifa. This result is due to the fact that Haifa is dominated by multi-story apartment buildings. In contrast, daily schedules were preferred by 55% of Rusafa respondents, 42% of Falestin’s respondents and 35% of Haifa’s respondents.

5-2-4 Daily Routines

About 46% of Rusafa’s respondents indicated that their daily routine had changed after 2003. This compares with 54% of Falestin’s residents and 94% of Haifa’s residents, see Table 5-7. Again this difference is most likely the result of a combination of urban form and the counter-terrorism measures that are required to fit into that urban form.

Table 5-4: Household size

<table>
<thead>
<tr>
<th>How many families live in the house?</th>
<th>Falestin</th>
<th>Haifa</th>
<th>Rusafa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
</tr>
<tr>
<td>One</td>
<td>8</td>
<td>11.6</td>
<td>61</td>
</tr>
<tr>
<td>Two</td>
<td>57</td>
<td>82.6</td>
<td>38</td>
</tr>
<tr>
<td>Three or more</td>
<td>4</td>
<td>5.8</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>100.0</td>
<td>106</td>
</tr>
</tbody>
</table>

The chi-square test shows that there is difference in terms of household size across the three case study areas. According to the test there is an average relationship among the study areas and household size as \( \chi^2 \) 0.032<0.05.
Table 5-5: Methods used to accommodate families

<table>
<thead>
<tr>
<th>Method</th>
<th>Falestin</th>
<th>Haifa</th>
<th>Rusafa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repartition interior spaces</td>
<td>5</td>
<td>74</td>
<td>22</td>
</tr>
<tr>
<td>Use the garden</td>
<td>35</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Add new flat</td>
<td>18</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>95</td>
<td>47</td>
</tr>
</tbody>
</table>

Chi-Square test to check for significant differences in method used to accommodate families

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>124.875</td>
<td>12</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>135.834</td>
<td>12</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>229</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chi-square test shows that there is a significant relationship among the case study areas and the methods used to accommodate families as the t (0.000) is less than the significance level (0.05).

Table 5-6: Housing Tenure

<table>
<thead>
<tr>
<th>Do you own or rent?</th>
<th>Falestin</th>
<th>Haifa</th>
<th>Rusafa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own</td>
<td>66</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>Rent</td>
<td>17</td>
<td>45</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>115</td>
<td>79</td>
</tr>
</tbody>
</table>

The chi-square test shows that there is a significant relationship among the case study areas and the methods used to accommodate families as the t (0.000) is less than the significance level (0.05).
Chi-Square test to check for significant differences in housing tenure across

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>10.931(^a)</td>
<td>4</td>
<td>.027</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>11.265</td>
<td>4</td>
<td>.024</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>278</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is clear from the test, that there is an average relationship among case study areas and housing tenure as 0.027 less than the significance level 0.05.

Table 5-7: Change in daily routines

<table>
<thead>
<tr>
<th>Has your daily routine changed after 2003?</th>
<th>Falestin</th>
<th></th>
<th>Haifa</th>
<th></th>
<th>Rusafa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
</tr>
<tr>
<td>Yes</td>
<td>45</td>
<td>54.2</td>
<td>108</td>
<td>93.9</td>
<td>36</td>
<td>46.2</td>
</tr>
<tr>
<td>No</td>
<td>38</td>
<td>45.8</td>
<td>7</td>
<td>6.1</td>
<td>41</td>
<td>52.6</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>100.0</td>
<td>115</td>
<td>100.0</td>
<td>77</td>
<td>98.8</td>
</tr>
</tbody>
</table>

Chi-Square test to check for significant differences in daily routines

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>61.911(^a)</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>70.590</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>276</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The test shows that there is a significant relationship among the case study areas and the change in daily routines as the test result (.00) less than the significance level 0.05.
5-3 Terrorism and Counter-Terrorism Impacts on Urban Infrastructure and Daily Life

This part focuses on the impacts of counter-terrorism measures on urban services and facilities. It tries to answer the research questions “How do terrorism and counter-terrorism affect, and are affected by, urban form, controls and human behaviour?”

The first section includes the results of the review of documents and photos as well as all types of safety and security concerns used in the case study areas, as shown below.

5-3-1 Counter-Terrorism Measures

These measures involve formal responses which are classified as all governmental and institutional responses, including security measures and safety arrangements put in place to cope with acts of terrorism. The use of precast concrete barriers, temporary checkpoints and the imposition of curfews, were very effective in protecting the public. However, they had unintended consequences as they restricted the daily movements and activities of ordinary citizens. These restrictions differed from district to district based on urban form and the magnitude of the terrorist threat. Figure 5-1 shows the security measures used in the case study areas.

Research reveals that the measures and strategies used to cope with insecure circumstances increased the divisions in the city and influenced social demography and the urban fabric. Almukhtar (2014) shows in her article “The Effects of Urban Conflict and the Role of Community-Based initiatives in Baghdad” that the security policies used in Baghdad to reduce instability and manage political society through the concept of “ethno-sectarianism” generated a range of responses. They blocked the collective nationalist movement and had a great influence on the pre-conflict socio-economic dynamics.

Moreover, these policies contributed to a draining of the country’s resources and capital. The cost of a vertical panel (three metres in height) was $800, whereas a horizontal panel (about 1 square metre) was $300. Hundreds of thousands of these barriers were used in Baghdad and negatively influenced urban land use, density, and daily urban activities and movements; about 60% of city’s roads and paths were
blocked (Al Mutmar, 2014). Also, they significantly increased ethnic divisions among city’s neighbourhoods and deconstructed the urban fabric, disfiguring the visual perspective of Baghdad city, see Figure 5-2.

Following the events of 2003, and particularly during 2007, the terrorism and the security measures used to counter-terrorism impacted and restricted individuals’ daily activities and movements. These restrictions differed from district to district based on the urban form and the magnitude of the terrorist threat. Approximately 58% of respondents from Rusafa indicated that their daily movements had been restricted by the precast concrete barriers, compared to 70% in Falestin and almost all in Haifa. About 94% of Haifa respondents indicated that their meeting places changed since 2003 compared to 63% in Falestin and 42% in Rusafa.

Figure 5-1: The security measures used around land use in the three case study areas. Photo by the author
5-3-2 Infrastructure

This section looks at the informal responses used in the three case study areas in times of insecure circumstances to provide a safer, more secure environment. Most of these responses affected daily activities as shown. According to official announcements, about 80% of Iraqi infrastructure components have been targeted directly and destroyed since the Gulf War. The New Sabah newspaper indicated on 23rd of January 2013 that about 92% of power stations’ ability to produce electricity has been disrupted and 80% of production capacity destroyed during that period. Moreover, about 100 bridges and rail lines were destroyed at the same time. The following section provides a detailed description of what happened.

Transport infrastructure. It has been previously mentioned that about 100 bridges and transport lines were directly targeted during the Gulf War. Moreover, the transport systems experienced a multitude of difficulties after 2003. Some of these difficulties were related to the regulations and rules used, whereas others were the result of aging transportation systems and the means used. Regarding the first difficulty, the weakness of regulations and surveillance systems encouraged people to import old and unsuitable cars randomly, so the roads and transport systems were completely filled with these cars. The importation of cars continued till March 2010 when a
decision was made by the Iraqi government to stop the imports of old cars and to replace the old imported cars with new ones. This decision included encouraging governmental transport sectors to import cars rather than the private sectors doing so (AlSUMARIA NEWS, 2013). The public transportation and the strategies used, on the other hand which were results of several reasons such as economic sanctions and terrorist attacks, have been neglected and been replaced by private cars, and transportation. Both cases provided easy means and a suitable environment for the terrorists to use this sector.

The results from the survey of case study area residents found that for district centre shopping, about 48% of Rusafa respondents preferred to walk compared to 23% in Falestin and 17% in Haifa. As for the preferred travel mode for “other district” shopping, about 39% of Haifa respondents indicated that they used their car. However, only 7% of Falestin, and 9% Rusafa respondents used their cars for this type of shopping. For this trip they largely used other transport means such as bus and mini bus – 36% in Falestin and about 25% in Rusafa.

Thus about half of Rusafa respondents preferred shopping at the district centre, and demonstrated less preference for shopping at nearby or other district centres. On the other hand, Falestin respondents preferred shopping at the closest district centre and were less apt to shop at other district centres. Rusafa respondents preferred to walk to shops at their district centre. For shopping at nearby or other district centres Rusafa respondent’s relied on mini buses as alternative modes.

Travel behaviour. A range of factors can affect transportation behaviour within an urban environment. For example, urban form and land use can play significant roles in shaping individual travel behaviour. Pan et al. (2009) demonstrate that traditional urban form can greatly restrict transport behaviour because it makes the use of motorized modes more difficult while making non-motorized modes such as walking and cycling easier. Conversely, modern urban form tends to increase private motor vehicle use for commuting and other travel (Cervero and Day, 2008). The use of private motor vehicle is convenient because it can provide travel options of a range of
household activities; hence motor vehicles strongly influence travel behaviour (Buliung and Kanaroglou, 2006). Individual travel behaviour can be affected by urban form, land uses, and their activities.

However travel behaviour can also be dramatically affected in terrorist affected cities. The destruction of transport infrastructure increases in terrorist acts and measures to counter terrorism are the main factors influencing travel behaviour. In Baghdad, the methods used by the terrorists against civilians, particularly in crowded markets and institutions, have changed daily activities, routes and transportation modes. Individuals adopted more defensive and protected behaviour to cope with the unstable security situation. For example, many daily activities and trips that historically occurred at the district level, now take place within smaller district neighbourhoods. This change in travel behaviour has been exacerbated by the damage to transport infrastructure from the war and terrorist actions and subsequent rebuilding efforts. Furthermore, the use of security measures like precast concrete barriers and rings of steel as well as check points have also affected travel behaviour see Figure 5-3.

Based on the survey, about 53% of Rusafa respondents indicated that their route to work, school, etc., changed after 2003 compared to 63% in Falestin and 95% in Haifa. The high percentage in Haifa is due to: 1) the number and severity of terrorist attacks; 2) the modernist urban form; and 3) the counter terrorism measures in terms of blockades, etc. that were required to secure this type of urban form. Therefore, the parking spaces which were distinctively designed and which were used increasingly by the residents completely closed and been changed.
Electricity. The first use of electricity in Iraq was in the early 20th century. From that period until 1991, almost 90% of the populations’ demand for electricity was supplied from general power stations which exceeded the local demand (UNDP Report, 2008). According to the UNDP report, the Iraq official production of electricity from power stations reached 6000 MW before the Gulf War in 1991. The Iraq population at that time was 22 million. After the Second Gulf War and the Iraq invasion in 2003, this percentage of electricity production decreased to 3500 MW. After investment and refurbishment of power stations and generation systems, the generation capacity reached 5300 MW in the summer of 2008, whereas the population increased to 30 million and the demand increased to about 10,000-11,000 MW. The report indicates that about 70% of power systems of Iraq were destroyed during the Gulf War and no power generation capacity was added from 1990 till late 2004. This issue was emphasised by Gellman (1991), when he highlighted that around 700 specific infrastructure locations were likely to be targeted during the war. These locations represented the power stations and distribution lines which were the key factors in the disruption of the daily life, and would lead to the complete destruction of infrastructure and services in Iraq. He shows in his report “The allied Air War struck broadly in Iraq” that the worst civilian suffering has resulted directly from the deconstructing of electrical plants, oil refineries and transportation networks.
These attacks disrupted power stations and distribution lines, so the Iraqi government took the responsibility to arrange and schedule electricity production and provision. Since 2003, the continual terrorist attacks on power distribution lines made the official electricity production and distribution not sufficient to fill the shortage. For example, in late 2006 (a peak period of terrorist attacks) daily electricity demand in Baghdad city was at or above 20 percent, whereas the daily supply from the electricity grid was at or below 12 percent; this represented 43 percent of the total population demand for electricity in Baghdad (Burke, 2007). The average of hours of power supply during the mentioned period was about 8 hours in Baghdad. The following figures illustrate the difference between the electricity supply and the estimated demand within Baghdad city during the period 2004-2007 and the hours of electricity received.

Figure 5-4: Daily Electricity Supplied and Estimated Demand in Iraq since January 2004

<table>
<thead>
<tr>
<th></th>
<th>5-Dec</th>
<th>12-Dec</th>
<th>20-Dec</th>
<th>27-Dec</th>
<th>3-Jan</th>
<th>10-Jan</th>
<th>17-Jan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baghdad</td>
<td>7.3</td>
<td>6.6</td>
<td>6.3</td>
<td>7.5</td>
<td>5.4</td>
<td>3.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Nationwide</td>
<td>10.1</td>
<td>8.9</td>
<td>9.3</td>
<td>8.8</td>
<td>8.9</td>
<td>7.8</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Figure 5-5: Baghdad Average Hours Electricity Received, Dec 2006-Jan 2007
Source: (Burke, 2007)

The government’s attempts to improve and develop the power section, increased daily hours supplying in Baghdad to about 15 hours in January 2010 (Cordesman, and Burke,
Electricity shortage significantly affected individuals’ daily lives and activities. Therefore, people began to search for alternative ways. They have been using general and household generators besides the governmental supplied electricity to fill the shortage (see Figure 5-6). This adaptation was motivated and supported by the local governments and became more popular among Iraqi families.

Primary data from the survey suggests that the use of alternative sources for electricity generation is quite common across the case study areas. About thirty four per cent of residents in the Rusafa used district generators to supply electricity. The percentage of utilization was 49.4 %, and 72.3%, for both Palestin and Haifa district residents, respectively. About 10% of the Rusafa residents utilised a household generators to supply the electricity; whereas, the percentage of utilization was 25.3% and 18.8% for both Palestin and Haifa residents, respectively see Table 5-8.

Table 5-8: Source of Electricity

<table>
<thead>
<tr>
<th>Where do you get your electricity</th>
<th>Palestin</th>
<th></th>
<th></th>
<th>Haifa</th>
<th></th>
<th></th>
<th>Rusafa</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District Generators</td>
<td>39</td>
<td>49.4</td>
<td>81</td>
<td>72.3</td>
<td>27</td>
<td>34.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District and Local Generators</td>
<td>11</td>
<td>13.9</td>
<td>1</td>
<td>0.9</td>
<td>3</td>
<td>3.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Generators</td>
<td>20</td>
<td>25.3</td>
<td>21</td>
<td>18.8</td>
<td>8</td>
<td>10.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>98.6</td>
<td>103</td>
<td>92.0</td>
<td>38</td>
<td>48.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square test to check for significant differences in electricity sources

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>97.511</td>
<td>14</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>101.827</td>
<td>14</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>270</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Water. The supply of water created further problems for victims of wars and subsequent events. It was used as a weapon against civilians in Iraq during the Gulf War. “In the early days of the war, there were behind the scenes discussions at the United Nations about using Turkish dams on the Euphrates River to cut off water to Iraq in response to its invasion of Kuwait” (Gleick, 1994). The battle of water became the principle of contemporary conflicts particularly for countries that control the water flow.
Water has been used as a pressure factor to achieve political and international aims. Diplomatic tensions with neighbouring countries such as Turkey, Syria and Iran, as well as lack of water management and inefficient irrigation techniques were the main reasons behind the water crisis in Iraq. A UN report indicates that hundreds of thousands of Iraqis have fled their settlements since 2005 due to the water crisis, and it was estimated that the water level will fall by 43 billion cubic metres by 2015 (al-Hasani, and al-Shara, 2010).

The water crisis will increase rapidly by 2017 due to the Turkish massive dam-building scheme. This project involves constructing 22 dams and 19 hydropower plants on Tigris-Euphrates basin, and will lead to decline of water flow to Iraq about 80 per cent (Wilson, 2012).

Moreover, continual destruction of the electricity supplies, and generation stations during and after 2003 affected significantly the water treatment centres and disabled their generation capacity. Ashraf, H (2003) demonstrated in his article that the allied forces’ focus on infrastructure targets and in particular, the electricity generation systems, destroyed and disabled water and sewage treatment centres, and left about 40% of the population without access to potable water.

Therefore, the residents adopted different methods to tackle the shortage in official water supply. They managed their needs and activities according to the daily hours of water supply, and used special storage tanks. Moreover, they used traditional storage techniques to cool the water during the summer time.

Communications. This sector has seen a dramatic change over the last decade. Before 2003 the use of land lines was the only communication system in Iraq. This system has lost about 50% of its ability during the First Gulf War due to destructive attacks. Second Gulf War and the events of 2003 disrupted the use of land lines completely. Since 2003, alternative communication devices such as mobile phones were increasingly used. This behaviour became a fashion among the residents. In spite of
their incredible role and benefit to Iraqi society, mobile phones have been misused by the terrorists. According to official announcements, the majority of terrorist attacks were implemented by use of mobile phones. Despite these wrong uses, the number of participants increased rapidly during the last decade. The number of subscribers jumped from 400,000 in 2003 to over 21 million in 2010 (Hamdan, 2011). The official directorates justified this increase for two reasons; the first was due to the cheap sim card price, the second was due to the significant damage of land lines which were disrupted during and after 2003 as a result of war and terrorist acts. Mobile phone services in Iraq are run by private companies namely Zain, Asiacell, Korak, Itsalna, Kalimat, and Imnia. These companies have more than 3000 towers in Baghdad. The following figure illustrates Kalimat towers within the case study areas as shown below.

![Figure 5-7: Kalimat tower locations within the three case study areas](image)

Source: Personal communication, 2012

Mobile phone towers became part of the urban skyline perspective within the case study areas. It was affected and affected by several factors; including the legislations and rules used within each district and urban structures.
Health. Before 2003, in the aftermath of the Gulf War during economic sanctions, this sector had suffered a significant decrease in the services. This led to an increase of the rate of “brain drain” of specialists. Meanwhile, this sector was not given the government priority; for example the allocated annual budget for medical services and medicine was about $500 million in 1990, decreasing to just $40 million in 1996 (Rawaf and Salman, 2005). Moreover, the use of banned weapons and bombs during the Gulf War had caused extreme health problems and were considered a crime against humanity. This reality has been confirmed by governmental and international surveys. “The gulf war against Iraq in 1991 was the first known conflict where DU rounds where used in large quantity (approximately 300 DU tones)” (Giannardi and Dominici, 2003). The effects of these weapons have been emphasised by the Iraqi government; according to the statistics, use of depleted uranium increased the numbers of causalities due to cancer from 40 out of 100,000 people in 1991 to 800 out of 100,000 people in 1995. This number was doubled in 2005 to become 1,600 out of 100,000 people (Al Jazeera, 2013). Moreover, the survey which was done by Guerrero Serdan (2009) argued that there was a clear health difference among children within and outside of cities which have witnessed violence. The survey showed that children who were born in violence-affected areas were about 80cm shorter than those in the other less affected areas.

Primary data obtained from the survey found that access to health service varies across the three study areas. About 23% of Rusafa residents received health services from the local traditional clinics (unauthorised services). Whereas, the percentages of residents who used local traditional clinics were about 18% in Falestin and 10.6% in Haifa districts.

About 35% of Rusafa residents have used private hospitals to get the health services. Whereas, private hospitals usage rates were 44%, and 33.6% in Falestin and Haifa districts respectively. The percentage of public hospitals use was 52% in Haifa district; approximately twice the rates in Rusafa and Falestin, which were 29.%, 27.% respectively see Table 5-9.
Table 5-9: Preferred health facility

<table>
<thead>
<tr>
<th>Where do you go for health services?</th>
<th>Falestin</th>
<th>Haifa</th>
<th>Rusafa</th>
<th>Falestin</th>
<th>Haifa</th>
<th>Rusafa</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
<td>Percent</td>
<td>No.</td>
</tr>
<tr>
<td>Local Traditional Clinic</td>
<td>15</td>
<td>17.9</td>
<td>12</td>
<td>10.6</td>
<td>18</td>
<td>22.8</td>
</tr>
<tr>
<td>Local and Private</td>
<td>6</td>
<td>7.1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>Local and Public</td>
<td>2</td>
<td>2.4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>Private Hospital</td>
<td>37</td>
<td>44</td>
<td>38</td>
<td>33.6</td>
<td>28</td>
<td>35.4</td>
</tr>
<tr>
<td>Private and Public</td>
<td>1</td>
<td>1.2</td>
<td>4</td>
<td>3.5</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Public Hospital</td>
<td>23</td>
<td>27.4</td>
<td>59</td>
<td>52.2</td>
<td>23</td>
<td>29.1</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>100.0</td>
<td>113</td>
<td>100.0</td>
<td>79</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Chi-Square-test to check for significant differences in the type of preferred health facility

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>30.008</td>
<td>10</td>
<td>.001</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>34.973</td>
<td>10</td>
<td>.000</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>276</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall, urban form, infrastructure and daily life was affected by terrorism and counter-terrorism measures. Also, they affect and are affected by resident behaviour. The findings reported above were confirmed from the interviews of planning professionals. Seventeen out of the 20 interviewees indicated that building form and structure had been significantly affected, whereas just three out of 20 said that these effects were negligible. Ten out of those who indicated that there was a significant change believed that the security measures and barriers were the main reasons. Six out of 17 interviewees, who confirmed the significant effects in the urban form, indicated that unstable security circumstances and an increase in terrorist acts had increased internal displacement; hence increased population density has encouraged the concept of splintered units.
Chi squared analysis

This section shows if the differences among the variables are significant statistically or not across the three case study areas. The chi-square results are shown in Table 5-10 below. The results of Chi-square test in the above table have been arranged respectively from not significant difference for the test results over the significance level 0.05, to an average and significant differences to the results close to and less than significance level 0.05 respectively.

So, the first three questions in the table represents the first category (not significant differences) whereas, the questions four to six show the second category. The rest questions in the table represent the third category (significant differences).

Table 5-10: Summary of Chi-square results

<table>
<thead>
<tr>
<th>Question</th>
<th>Chi-square</th>
<th>df</th>
<th>Asymp Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long have you lived in the district?</td>
<td>7.336</td>
<td>4</td>
<td>0.119</td>
</tr>
<tr>
<td>Do you meet your friends close to your house?</td>
<td>7.493</td>
<td>4</td>
<td>0.112</td>
</tr>
<tr>
<td>Do you live with your parents?</td>
<td>11.168</td>
<td>6</td>
<td>0.085</td>
</tr>
<tr>
<td>How many family members live with you?</td>
<td>10.536</td>
<td>4</td>
<td>0.052</td>
</tr>
<tr>
<td>How many cars do you own?</td>
<td>13.514</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>Do you own or rent?</td>
<td>10.931</td>
<td>4</td>
<td>0.027</td>
</tr>
<tr>
<td>If there are more families, what is the reason?</td>
<td>27.514</td>
<td>2</td>
<td>0.007</td>
</tr>
<tr>
<td>Has your house changed as a result of insecure circumstances?</td>
<td>15.342</td>
<td>4</td>
<td>0.004</td>
</tr>
<tr>
<td>How do you schedule your daily activities?</td>
<td>20.001</td>
<td>6</td>
<td>0.003</td>
</tr>
<tr>
<td>Where do you go for health services?</td>
<td>30.008</td>
<td>0</td>
<td>0.001</td>
</tr>
<tr>
<td>Where do you get your electricity?</td>
<td>97.511</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>If you own, how are other families accommodated?</td>
<td>124.875</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Where is your preferred shopping area?</td>
<td>46.236</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>What is the mode of travel used?</td>
<td>36.809</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Where do you park your car?</td>
<td>150.726</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>How many families live at the same house?</td>
<td>78.354</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Has the place you meet your friends changed since 2003?</td>
<td>62.994</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Was this change a result of insecure circumstances?</td>
<td>50.394</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Has your daily routine changed after 2003?</td>
<td>61.911</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Did your route to work, school, and etc. change after 2003?</td>
<td>50.086</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Do precast concrete barriers restrict daily movement?</td>
<td>52.239</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
5-4 Collaborative Domain between Urban Planners and Security Experts

This section was designed to create a collaborative domain between urban planners and security institutions in planning future strategies to cope with insecure circumstances.

The researcher could not obtain enough data relating to this domain due to security and privacy issues and the ongoing insecure situation. The majority of interviewees confirmed the importance of creating such departments.

To achieve the objective of this domain, the research suggests creating semi-official organizations, which are supported by government and which bring together both urban planners and security organizations. As a first step, this makes the security agencies participate through this semi-official channel and thereby connects them indirectly with urban planners.

Also, the research suggests the importance of creating special security-related materials which can be studied as planning materials at universities. These will contribute significantly to increasing urban planners’ knowledge and background about the latest safety and security related issues.

Moreover, this department should be supported by new legislations and regulations as an effective way to protect urban form and activities. This has been confirmed by interviewees, as they reiterated the importance of regulations and government surveillance to preserve urban form and daily life. Seven out of 14 interviewees indicated that the absence of regulations and monitoring was the main factor behind the building form changes. Exactly 75% of interviewees (fifteen out of 20 interviewees) confirmed that the weakness of urban controls and legislations, affected urban conservation programs, which caused a significant reduction in monitoring of urban spaces. These in turn encouraged people to use strange building designs and materials
5-5 Conclusions

The chapter includes four main parts: urban form and human behaviour; Individuals’ behavioural responses and the acts of terrorism; terrorism and counter-terrorism measures/ urban infrastructure and daily life; and the collaborative domain between urban planners and security experts.

The results in this chapter are based on three sources: the first is a fieldwork and document review; the second is through the questionnaire survey; the third is via interviews.

In regard to the results of the first source (the fieldwork and document review), the research reveals that both urban form and infrastructure have suffered great damage from wars and terrorist acts. About 80% of infrastructure including 100 significant bridges has been completely disrupted and destroyed due to the Gulf War and its consequences. The power system producing electricity declined significantly affecting other public services and facilities, including water and health services.

Fieldwork observation shows that the terrorist acts following war and their subsequent consequences also affected urban form and daily life through two ways: the first is direct attack which includes destructing and disrupting urban infrastructure by using different terrorist methods such as car detonation and suicide bombing. The second way is indirect attack through generating a range of formal and informal responses. Although, the formal responses (institutional arrangements) aimed to secure and protect urban form and individuals’ life, but they influenced urban physical form and daily life. Moreover, informal responses (individuals’ behaviour) also indirectly impacted on urban form and activities.

The results of the second source (questionnaire survey) on the other hand, show several points. The general characteristic outcomes confirm that there were differences in the size of households within the three case study areas, and three different methods were used to accommodate the increase in the households’ sizes. These methods were repartitioning the interior spaces, adding new flats and expanding horizontally by using gardens and open spaces.
As for the transport behaviour, the results show that there were significant differences in the residents’ transport behaviour across the three case study areas in terms of using and owning private cars.

It is also evident from the survey result that urban daily activities have been increasingly affected by the terrorist acts and insecure circumstances. The magnitude of affects was differed form to another. The results confirm that the individuals’ daily routine, and the use of alternative routes to work or school changed as a result of the terrorism threats, and the counter-terrorism measures. As for urban daily facilities and services, the research focuses on electricity, health, and care provision. The results confirm that the disruption with electricity supply has highly affected residents’ mobility and their daily movements in high-rise buildings while the impact of the same issue on the traditional and modest urban form has been proven to be minimal.

The investigations and observations show that local residents adopted new methods or power sources to fill the shortage in electricity capacity. The residents utilized district and household generators besides the government supply. The results reveal that the use of district, and household generators differed based on urban form and structure.

Regarding the third source (interviews), the results show that the insecure circumstances increased population movement on one side, and residents’ measures used to cope with surrounding unstable events on the other side. Moreover, the absence of regulations and municipality monitoring were considered the other main reason which affected urban form. Also, the modernization and internet systems encouraged people to use different kinds of building designs and finishing materials, these in turn caused the spread of strange and known designs which affected negatively urban form and perspective. Moreover, the results confirm that inequality of population density has caused horizontal expansion for urban form in some neighbourhoods and resulted in disappearance of gardens (in front and backyards) and open spaces. Also, it was the reason to spread of splinter units (small houses with narrow frontages) in some districts like Falestin.
Overall, the majority of interviewees focused on the role of regulations and municipality’s monitoring in supporting and conserving an urban form during insecure circumstances. The interviewees also confirmed that the traditional urban form which was represented in Rusafa was highly neglected by local municipality, and there were fewer conservation programs to serve and renovate this traditional form which caused great damage to its form and infrastructure.
6-Discussion

6-1 Introduction

Throughout the course of history, different types of urban forms as well as different building materials have been used. Each has had a range of strengths and weaknesses that have impacted urban life. As discussed in the literature review, safety and security concerns were an essential function of urban settlements and forms as they represented early attempts to cope with threats and to survive.

Today the situation is more complicated because there is a diversity of internal and external threats. The tactics used by terrorists have become more sophisticated, and there is a shortage of evidence about the role of urban form in providing safety and security in contemporary terrorist affected cities.

Moreover, the comparison among different types of urban forms (modern, semi-modern, traditional) in terms of their impact on security is another factor that makes this research more comprehensive. This in turn contributes to an improved understanding of the advantages of each form and will assist in creating an urban form that is more defensive and able to sustain a safer living environment.

To understand and compare the three types of urban form, this chapter begins with a discussion of the conceptual framework components (individual behaviour, urban form, and terrorism and counter terrorism measures) and links them to the research results and to the existing literature. This chapter is organized into five sections. The first is an introduction, while the second focuses on individual behaviour and urban form and covers several relevant issues such as safety and security, permeability, use of urban infrastructure and facilities, resilience, and social norms and traditions.

The third section focuses on individual behaviour and terrorism/counter terrorism, and examines issues related to the use of urban transport modes, routes and daily activities.
The fourth section concentrates on urban form and terrorism/counter terrorism measures, and discusses how security arrangements affect meeting places and the use of transport modes and routes.

The fifth and concluding section identifies how a liveable, safe and more secure urban form might be achieved – one that is less affected by safety and security measures.

**6-2 Individual Behaviour and Urban Form**

Individual behaviour can have great impacts on urban form, and likewise, urban form plays an important role in shaping individual behaviour. However, this relationship differs according to the surrounding environment. For example, in secure and stable circumstances, urban form can be used to create an active, productive and liveable environment (Handy et al., 2002). In addition, it can be used to shape household activity patterns (Frank, and Engelke, 2001).

Urban form can also be used to create more safe and secure environments under conditions where security is problematic. Jeffery (1971) confirms that urban form, design and materials can have a key role in creating a safe environment as well as playing a significant role in directing and guiding individual behaviour (Newman, 2009).

Previous research has not focused on specific objectives, or the status of individual behaviour and urban form generally, within secure and insecure circumstances. The urban form that suits different security conditions was not examined. Therefore, this research provides a comparison of three different urban forms and how they impact and are impacted by insecure conditions. This contributes to the knowledge about what the most preferred urban form might be under different security conditions. To achieve this objective the research focuses on some planning factors that are related to individual behaviour and urban form.

**6-2-1 Safety and Security Factors**

This research used a number of variables to measure safety and security, including density, accommodation trends and rental value. The tendency of residents to live in and choose their own home design, materials, and communities under varying security
conditions are indicators of the form, design and building materials that are safe and more protective. The results suggest that a mixed urban form, followed by a traditional form, was the best when dealing with insecure conditions.

Moreover, the trend of residents to live in and to reuse indoor functions and outdoor spaces are real indicators of the preferred urban form, reflecting the stability and flexibility of the chosen form within different security conditions. Some argue that these trends result in centralised activities and increases in density, leading to decreased quality of urban life (Camagni, Gibelli, and Rigamonti, 2002; Jenks and Burgess, 2000). However an increase in density makes the urban space more appealing to residents during unstable times (Glaeser and Shapiro, 2001). The research confirms that residents’ behaviour in choosing their own designs and building materials while living in insecure conditions reflects safety and security measures as well as the flexibility of the urban form. The research results show that the mixed form in Falestin was preferred by the residents based on two criteria: 1) the accommodation trend including spread of splintered units (see Figure 6-1); and 2) rental value. The situation was somewhat different for traditional compact form in Rusafa, where there was no significant change in the building form and design when compared with the other two forms. As for modern high-rise buildings, the situation was different as there was a tendency to repartition inner spaces to accommodate the residents.

The importance of the accommodation variable was confirmed by the interviews in which 15 of the 20 interviewees indicated that security and safety concerns were the reason for the spread of splintered units in some neighbourhoods.

Therefore, the above criteria (accommodation trend) were used to identify the ideal, flexible, safe and most secure form in which to live. The results suggest that mixed urban form districts were more active and safe when compared with the other types of urban form areas.
6-2-2 Permeability

This factor plays a key role in increasing or decreasing acts of terrorism. It is the physical configuration of street networks and connections which are used by both cars and pedestrians. This factor is very important in terrorist affected areas due to several reasons. From a security perspective, permeability can be used to measure security status, as the majority of terrorist acts have been implemented through the use of urban streets. From social and economic perspectives, permeability represents the channel that sustains and connects urban social and economic activities. This element is configured and affected considerably by urban form and land use.

Urban form, land use and infrastructure play a significant role in shaping car use and travel behaviour (Newman and Kenworthy, 2006; McMillan, 2005; Fabiyi, 2008). These,
in turn, contribute considerably to an increase or a decrease in urban form permeability.

Under insecure conditions, individual movement and the number of cars used and owned are strong indicators of urban form permeability and resilience. They also reflect the status of security and safety in each neighbourhood. This research used two criteria to examine urban form permeability: 1) transport modes used to access urban services and facilities; and 2) number of cars owned per family. The results show that the mixed form in Falestin had the highest permeability in terms of the use and ownership of cars, whereas the compact traditional form (in Rusafa) had the least permeability, followed by the modern form (in Haifa). A number of valuable insights can be derived from these results.

- The security situation in Falestin (mixed form) was more stable, therefore the residents used motor vehicles more than those living in the other case study areas (Rusafa and Haifa).
- The form and structure of Rusafa, with its traditional and compact form characterised by restricted entrances and exits, and Haifa with its modern form and connected arcades along the streets, were less permeable because of parking restrictions. Conversely, Falest in was more flexible because there were fewer restrictions on car parking.
- The restricted access and traditional walking pathways in the traditional compact form in Rusafa were the main reasons for reduced car use. Reduced car use has the added benefit of limiting terrorist car bomb attacks. Together these reasons make urban life in traditional areas more stable when compared with life in other, more modern, urban forms.
- The concentration and distribution of shopping centres is another factor that can limit the use of motor vehicles. For example, the distribution of activities and shopping areas on the Al-Mahalla level within Rusafa is one of the reasons for reduced car use and heavier reliance on walking.

Overall, the above criteria on transport modes reveal that the mixed form of Falestin was more permeable when compared with the compact (in Rusafa) or modern urban form (in Haifa).
6-2-3 Use of Infrastructure and Facilities

The research suggests that the use of facilities and infrastructure are important resilience indicators. It is apparent from the research results in the three neighbourhoods (Rusafa, Falestin and Haifa) that infrastructure and facilities such as transport, electricity, health, and shopping were used differently throughout the three different forms. As for transport routes, the use of the common routes and fewer changes in individuals’ adopted routes mean that the urban form is safer and more secure than those which have experienced significant changes. According to the research results, the residents of Rusafa had the least changes in their routes to work or school followed by the residents of mixed-form Falestin, whereas the residents of the modern Haifa district had the most changes in their daily routes.

As for urban facilities, one of the most important is electricity. As discussed in Chapter 5, the residents of Rusafa and Falestin used less electricity compared to the residents of Haifa. The reasons behind this may be due to several factors.

- The first is that lower income may be the reason for less consumption of electricity and the use of district generators. For example, each family needs at least 4-6 AM (a unit of measure of the rate of electron flow in an electrical conductor) of electricity and each AM costs about ten Australian dollars. Based on this estimate, the reduced electric consumption by the Rusafa residents may be related to low income levels when compared to the other two areas. However, the results of the survey suggest that despite the high rental factor (high costs of renting) in Falestin, the residents used less electricity when compared to those living in Haifa, which had a low rental indicator compared to the Falestin district, but these residents had the highest use of district generators. Therefore, income is one of a number of factors responsible for reduced electricity use. This was confirmed recently when the local governments supported the district generators by providing fuel in order to minimize the load on individuals’ income.

- The second proposition is that the urban form and design, as well as building materials, may explain electricity consumption. For example, Rusafa embraces traditional compact form and is known for its unique
designs with inward orientations around courtyards. Moreover, the building materials used, bricks, arches and arcades, help to minimise electricity use. Conversely, Haifa embraces a dispersed form and the design of its buildings was directed outwards, with precast concrete panels commonly used for building. Together these factors are responsible for the increase in electricity consumption. The residents of Falestin used mixed designs (traditional and modern) in addition to a mixture of building materials and structures. These are the reasons behind the moderate level of electricity consumption.

6-2-4 Resilience Indicators
The research supposes that resilience of form can be achieved through two means. Firstly residents are able to reuse the urban spaces and functions in a way that provides a safer and more secure environment. Secondly, the urban space can be integrated and strengthened by the use of security measures to cope with external threats. The results highlight the fact that traditional forms (in Rusafa) followed by mixed forms (in Falestin) were the most flexible in accommodating increased household numbers, and were less affected by the precast concrete barriers used to deter terrorist acts and to secure residents. Therefore, traditional and mixed urban forms are flexible and robust because they are able to house an increasing population, while not affecting security measures.

6-2-5 Social Norms and Traditions
The research confirms that urban life, including social norms, traditions and activities, can be maintained and improved by using coherent and connected urban form (Salingaros, 2000). This contributes significantly to enhancing the quality of urban life and increasing the well-being of residents (Loukaitou, 1995). The majority of research on social norms and activities and relationships with urban form has not examined how such relationships are impacted by insecure circumstances such as acts of terrorism. Thus this research examines how urban social activities are impacted by insecure circumstances.
The research uses the behaviour of individuals living in different districts, and their attempts to practice the norms and traditions within insecure circumstances as indicators to measure the forms’ solidity and sustainability. The results show that residents living in traditional districts, followed by those living in mixed forms, were most active in terms of practicing their daily norms and traditions, compared with the residents of modern districts. Also, the results confirm that the daily meeting places for those living in traditional and mixed forms were not affected by insecure conditions as much as those living in modern districts.

6-3 Individual Behaviour, Terrorism and Counter Terrorism

Research shows that individual behaviour can affect the impacts of violence (World Bank, 1999). Likewise, violence and conflict can shape individual behaviour (Sobel, 2002). Counter terrorism measures such as “rings of steel” and high-tech surveillance systems restrict social activities and movements (Jeffries, 2013; Fawaz, Harb & Gharbieh, 2012; Graham, 2011). This section of the chapter discusses how insecure conditions impact on transport modes, routes and daily activities based on the research findings provided in Chapter 5.

6-3-1 Transport Modes

Terrorism and counter-terrorism affects travel behaviour because it impacts travel modes and routes (Glaeser and Shapiro, 2001). Travellers try to avoid exposure to terrorist acts by using alternative modes and actions (Huddy et al., 2002). An individual’s behaviour in relation to owning and using a car is considered a strong measure of permeability, stability and security. In addition, the use of special travel modes in insecure conditions is an indirect indicator of safety and security. For example, the tendency of a resident to walk to services reveals that the travel mode within that district is safe and secure. According to the research findings, travel modes in the traditional and mixed forms were less affected by insecure conditions than modes in more modern districts.

6-3-2 Transport Routes

Urban infrastructure, particularly transport routes, can be greatly affected by terrorism. As Graham (2009) argues: “The future of warfare lies in the street, sewers,
high-rise buildings, industrial parks, and the sprawl of houses, shacks, and shelters that form the broken cities of our world”.

This research used the magnitude of changes in transport routes as an indicator of the stability of individual behaviour. The research supposes that the ongoing change of individuals’ used routes to work, school, and other urban activities is an indicator of the severity of terrorism acts and the impact of counter terrorism measures. According to the research findings, mixed form and traditional form were less affected by terrorist acts and counter terrorism measures compared to modern urban form. This is confirmed by the results of the interviews in which only six of the 20 interviewees indicated that security measure restricted travel routes.

**6-3-3 Daily Activities and Urban Services**

The majority of research examining the impacts of terrorism and insecure conditions on behaviour has not included the relationship between urban services and urban daily activities and their behavioural consequences. Thus this research examined the implications of insufficient urban services, such as electricity, on urban daily activities. Electricity supply and distribution was extensively damaged during the war and by terrorists, which impacted on urban daily life. Residents were forced to adopt alternative options to cope with the lack of electricity, as shown in Figure 6-2. The research results confirm that behaviour and adaptation to cope with the shortage differed according to urban form and building materials. For example, while those living in modern districts preferred to schedule their daily activities hourly, the reverse is true for the residents of traditional and mixed forms, who preferred to adhere to a daily schedule. The hourly schedule of activities might have occurred for several reasons, some might be related to security conditions, and others to availability of urban services such as electricity which restricted the use of elevators in high-rise buildings.
6-4 Urban Form, Terrorism and Counter Terrorism Measures

Urban form can be affected considerably by both terrorist acts and counter-terrorism measures. Coaffee (2003) argues that the urban forms in both Belfast and London were isolated and divided due to counter-terrorism measures such as the use of “rings of steel” and gated districts. The magnitude of the damage differs according to the type of security measure used. For instance, a variety of security measures were used in Beirut including fortified walls, military tanks and vehicles, concrete and plastic cones, blocks, sand bags and barbed wire. All of these measures have affected the urban form and have created the concept of “security architecture” (Fawaz, Harb & Gharbieh, 2012).

The review of the literature suggests that; 1) the majority of research has not examined how urban form affects responses, resistance and the magnitude of damage; and 2) very little research has been done on the impacts of counter-terrorism measures.

Therefore, this research discusses the implications of terrorism and counter-terrorism in three Baghdad neighbourhoods to identify the differences among varying urban form responses and to distinguish the most destructive counter-terrorism security measures.

The results of the fieldwork survey and observation reveal that a precast concrete barrier with a height of between 1.5 and 3 metres and a width of 1.2 metres was a
The changes in transport routes. This indicator was used to measure two main points. The first was to identify which form was more stable and safe (i.e. not affected by terrorism and security measures). The second was to measure the scale of damage in
transport infrastructure due to terrorist acts and counter terrorism measures. The scale of change in transport routes indicates that the used urban form including urban transport routes were unsafe and were under continual attack. Also, this change reflects the magnitude of damage in urban transport infrastructure.

According to the research results, the residents of traditional urban form followed by those living in a mixed urban form have not changed their transport routes, but there was a considerable change in the transport routes used by the residents living in the modern form.

The tendency of residents living in traditional urban forms to avoid a change in transport routes may be for several reasons including the security situation and the restricted structure, whereas the residents of mixed form had a high opportunity to change their transport routes due to the form’s flexibility and permeability. However, they had a moderate tendency to change their transport routes compared with the residents of modern urban form.

**Car usage.** This indicator is used to measure the form’s permeability during insecure circumstances and the magnitude of counter terrorism impacts on an urban form.

The research supposes that the number of cars used and owned within each form reflects the form’s permeability and resilience during insecure circumstances. Also, this can be used to identify the consequences of security measures used in each district. It supposes that routes restricted by urban form, structure and security measures (the use of precast concrete) play a significant role in reducing car usage, hence affects private car ownership. According to the research results, mixed form was more permeable and less affected by both terrorist acts and security measures.

**6-5 Conclusions**

It is clear from this chapter that several indicators were useful in comparing the three selected forms (traditional, mixed, and modern form), and observing individuals’ behaviour. According to these factors, the most liveable, resilient and more secure urban form can be achieved through: 1) creating mixed form with moderate rise
buildings (3-4 levels); 2) creating coherent and connected urban form which ensures a good social connection and which provides a distinctive disconnection between cars and pedestrians access, as well as encouraging the use of alternative transport modes; 3) adopting traditional design elements and materials which include an inward direction of functions, and the use of environmentally friendly building materials. These will contribute significantly to reducing impacts such as the unavailability of urban services due to acts of terrorism.
Chapter 7: Summary and Conclusions

7-1 Summary of Research

The research poses three significant questions in order to identify the relationship between urban form, individuals’ behaviour, terrorism/counter-terrorism and legislation. As mentioned in Chapter 4, these questions are: 1) how does urban form affect, and is affected by, human behaviour? 2) How do terrorism and counter-terrorism affect, and are affected by, urban form, controls and human behaviour in war affected areas? 3) How do urban controls and legislation affect terrorism and counter-terrorism in war affected areas?

According to the results, the first question was answered in three different responses across the three selected urban forms. With regard to the second question, the results reveal that the security measures used in case study areas considerably affected urban form, residents’ behaviour and daily activities. As for the third question, the results confirm the role of urban controls and legislation in preserving urban form and daily life during periods of insecurity.

The research focuses on a range of important factors relating to the relationships between urban form, individual behaviour, and terrorism and counter-terrorism measures. A review of literature relating to urban form impacts shows that urban form plays a key role in shaping individuals’ behaviour and cities’ structure. Also, the literature review reveals that urban form and individual behaviour can be influenced by terrorism and counter-terrorism measures through several channels. For example, the literature review shows that an urban environment, including urban physical form, structure and infrastructure, can be directly affected by terrorism and counter-terrorism measures. Moreover, these measures have a catastrophic effect on economic, social, and environmental capital. Accordingly, the literature review chapter reviewed three bodies of research: 1) urban form and its effect on human behaviour; 2) the impacts of terrorism and counter-terrorism measures on urban form and human behaviour; 3) the impact of urban governance and non-governmental organizations on urban form and daily life during periods of insecurity.
Within the case study chapter, the research divides this chapter into two parts. The first part includes a detailed illustration of Baghdad describing the three case study areas. This involves a brief summary of Baghdad’s geographical, historical, and political importance, and the urban governance and suggested master plans for Baghdad city which have taken place within the second half of the twentieth century.

The second part of this chapter discusses case study areas within Baghdad city. It specifies the criteria which were used to select the case study areas, shows the boundaries of each area and explains the social, cultural and economic values and factors in each neighbourhood. These neighbourhoods involve various kinds of urban forms, buildings and social structures including traditional, semi modern and modern forms. Each form and structure has unique characteristics.

Moreover, in this section of the chapter is a detailed discussion about terrorist attacks and the methods and tactics used by terrorists, together with an examination of the regulations and legislation used within each district.

The research design and methodology chapter shows the research questions and methodology used as well as the methods used to collect and analyse the data. This chapter explains the safety and ethical considerations which were used by the researcher to ensure the participants’ safety, and the limitations which faced the research team during the fieldwork survey process.

The results chapter discusses the three main resources used to collect the data. The first resource was a fieldwork and document review; the second was a questionnaire survey and the third were interviews.

Within this chapter there is a focus on urban planning responses in case study areas. This emphasises a range of responses within the three neighbourhoods researched in Baghdad city.

The discussion chapter focuses on three main sections: the first concentrates on individual behaviour and urban form; the second discusses individuals’ behaviour and terrorism and counter terrorism measures; the third focuses on urban form and terrorism and counter terrorism measures.
7-2 Conclusion

The research examined the impact of terrorism and counter-terrorism measures in three Baghdad case study areas. A review of the international media coverage from sources such as the *Washington Post*, *Reuters*, and the *BBC* during the study period suggests that Baghdad was one of the most affected cities in Iraq as a result of the magnitude of damage and casualties caused by terrorist acts. Within Baghdad, Rusafa was the most affected area, followed by Haifa and Falastin, based on a comparison of the number and size of terrorist acts.

However, in contrast to these popular media reports, the research findings reveal that the traditional district of Rusafa, including the centre of old Rusafa and the Falastin district which both have a mix of traditional and contemporary urban form, were safer, more secure areas. They were more active, sustainable and affordable compared to the modern Haifa district. The results of this analysis are built on fieldwork and a questionnaire administered to participants in the case study areas.

It is clear from the research findings that the daily life and behaviour of residents of the three case study areas were significantly influenced by terrorist acts and counter-terrorism measures, but at the same time differed significantly. The results confirm that these differences were related to urban form and structure. The results also show that the impacts of terrorism and counter-terrorism measures are diverse and their impact is, in part, dependent on urban form.

The residents’ informal responses displayed evidence of changes in a range of activities, infrastructure facilities, and daily life. The research findings confirm that these activities were increasingly used within Rusu fa and Falestin during periods of insecure circumstances, while they were less used in Haifa.

While individual behaviour within the case study areas differed, the results show that the behaviour of those living in traditional and mixed forms was more stable, compared with the behaviour of residents living in modern form areas.
As for the urban planning responses, this research shows that the security measures used to cope with terrorism also impact on physical form, infrastructure and daily life in different ways depending on urban form and structure. The research reveals that counter-terrorism measures affect people living in modern urban forms and restrict daily movement more than they affect people living in areas with traditional and mixed forms.

The results of interviews confirm the importance of both traditional and mixed forms, but highlight the fact that there were no planned refurbishments or conservation projects to protect the traditional form in the centre of Rusafa. The results suggest that the use of splintered units, as found in Falestin, was an acceptable strategy for use in other areas of Baghdad, including Rusafa.

Overall, the research findings show that despite the magnitude and scale of terrorist attacks within the case study areas, Rusafa (traditional form) and Falestin (mixed form) were safer and more secure than Haifa (modern form).

7-3 Limitations of the Study

The researcher experienced some limitations in conducting the research. The first involved administering the questionnaire and undertaking the fieldwork. The limitations involved several days’ delay in collecting data and changing the logistics for the fieldwork. These were due to security concerns resulting from increased government measures put in place to safeguard civilians, which reduced individual movement and activities.

There were limitations related to conducting the interviews as well. The interviewees in some directorates could not participate for security reasons, others refused to allow their interviews to be recorded, and a few asked the researcher to get their supervisor’s permission before they would agree to participate. Another example of the challenges of conducting the interviews was at Ammanat Baghdad, where the building’s security guards would not allow the researcher to enter with a recording device due to security concerns.
Some individuals in the Ministry of Municipality, Urban Planning Directorate agreed to take part in the interviews, however they were worried about the purpose of the research. While the more highly educated participants encouraged the research, they did suggest some changes to the questionnaire to make it safer and more secure.

As for choosing the case study areas (limitations represented by the physical selected case study), the research only chose the three cases within Baghdad city due to several reasons: 1) security concerns; 2) the time limitations; 3) Baghdad’s large suburbs and districts.

**7-4 Recommendations**

As has been shown by the research findings and reported by the international media, terrorists’ tactics have increasingly been directed towards urban infrastructure and facilities as a way of disrupting daily life and behaviour. Likewise, counter-terrorism measures, including the use of precast concrete barriers to deter acts of terrorism and protect the civilians, affected urban form despite its role in protecting residents’ security. Regardless of the similarities between what the media reports and the findings of this research, there are some points of difference. One of the key points is that some urban forms are more preferable and more liveable, despite the magnitude of the insecure conditions which exist in Baghdad.

As discussed above, in Baghdad, traditional and mixed urban form districts were much preferred to the modern urban form district. The characteristics that contributed to the district’s safety, security and sustainability are discussed below and have been grouped into three sections: design, planning and legislation. These characteristics should be viewed as key research recommendations that can be replicated in other areas undergoing similar insecure conditions due to terrorism and counter-terrorism measures.

**7-4-1. Design**

This group of characteristics focuses on design elements in protective forms such as traditional (in Rusafa) and mixed urban (in Falestin) forms that should be taken into consideration in the design of buildings in terrorism affected areas.
Courtyard. This is considered to be the main element of a traditional building. It has socio-ecological elements in that it reflects social life, family ties and privacy, as well as playing a significant ecological role by helping to reduce air pollution and noise. The courtyard can be employed at the level of a unit or a district block (see figure 7-1).

Building Envelope. This includes the external building design and includes elements such as outlets, slots and windows as well as finishing materials. For example, the window size accompanied by the appropriate finishing materials can contribute significantly to either increasing or reducing building privacy, safety and security. Moreover, the envelope and its elements can contribute to a building’s sustainability during times when basic services, such as electricity are interrupted (see figure 7-2).

Urban mass and space. The coordination and integration of buildings and spaces within an urban environment is important for harmony and unity. This element plays a key role in creating spaces that reflect the scale and social equality of the individual. Also, urban mass and space can contribute to creating more secure environments that preserve daily activities, traditions and norms (see figure 7-3).
Figure 7-3: The positive interaction between urban masses and spaces

Source: Coupland, 1997

**Space hierarchy.** The relationship between urban spaces is important for urban safety and security, particularly during movement from one space to another which is different in scale and features. Hierarchy plays a key role in ensuring privacy and safety, particularly when a space looks uncommon or uncomfortable to visitors and those from other communities (see figure 7-4).

Figure 7-4: Space hierarchy shows the movement from public, semi-public to semi-private and private spaces

Source: Al-Akkam, 2013

Overall, these design characteristics contribute considerably to reducing the impacts of terrorist acts and counter-terrorism measures. Design can also play a significant role in reducing the impacts of extreme weather conditions, particularly when basic services such as electricity are interrupted. Moreover, design can have a social impact by increasing ties among family members. Finally design can play a role in reducing the impacts of air pollution and noise.

### 7-4-2 Planning

Developing new planning strategies can reduce the impacts of terrorist acts. For example, building new transport systems that encourage the use of public transport is
an effective way to reduce the use of cars, hence helping to reduce car-related terrorism in the form of car bombs. Likewise, using natural features such as rivers within terrorist affected areas is a way of minimising the impacts of terrorism. For example, Baghdad’s Tigris River could be a natural solution in reducing the impact of terrorism by reducing physical exposure to terrorist attacks, as well the calming psychological effects the adjacent recreation areas can induce.

Using mixed spaces and forms in more efficient, effective ways can deter car-dependent travel. Action should be taken by transport departments to encourage more public transport use, thus reducing car use, because most of the terrorist acts in and around Baghdad have involved car bombs and have occurred on the highways.

The layouts of units, city and apartment blocks, districts, entrances, exits, pathways and streets as well as the relationship among districts are structural axes on which to increase urban planning’s role in creating a defensive environment. These in turn can strengthen the built environment rather than dividing and weakening it to forms that can be easily attacked.

Finally adopting residential strategies that focus on medium-rise buildings (rather than high-rise or low-rise buildings) is a suitable solution to coping with service disruptions, and avoids the use of lifts and other often unreliable services and facilities.

7-4-3. Legislation
Regulations play an important role in protecting an urban environment and deterring terrorist acts. They can regulate and guide design and planning elements in a way that contributes to restricting and minimizing the impacts of terrorist acts. However it is important for building and planning regulations to incorporate best practices to provide safety and security, particularly when faced with terrorism. To be most effective, the building and planning regulations need to be consistent. In other words, both sets of regulations need to insure that safety and security measures are being followed. Finally there should be some mechanisms for enforcement of these regulations. Without compliance the building and planning regulations will be
ineffective. Another strategy is to provide incentives that encourage individuals to adopt specific types of structures and forms.

By creating a collaborative domain that brings together urban planners and security institutions to develop and legislate for security planning rules, the most complicated issue in terrorist and war-affected areas will be simplified. This is how to coordinate the practices among those who are developing the planning strategies for the urban environment and those who are tasked with providing security for these spaces. Such a domain must acknowledge building requirements and the behaviour of residents as well as the local municipality’s role in monitoring the built environment.

Moreover, this collaborative domain can provide a database which is updated regularly with new measures, tactics and plans for detecting and deterring terrorism. The goal is to have counter-terrorism arrangements that support and strengthen the urban environment rather than affecting it negatively.

7-4-4. Recommendations for future study
The research highly recommends future studies to look for other types of urban forms and structures and find out how they respond during insecurity circumstances. Also, the research widely encourages future studies to look for other aspects of the three selected case study areas and find how they are changing over the time. Finally, the research recommends other studies to search if there are any differences between countries which they have suffered from similar issues and problems.
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Appendices

Appendix A

Questionnaire:

Dear participant:-

The research aims to study the changes in the urban form and its structure on one side, and the residents' behaviour on the other side within different periods. The requested questions are used for the purpose of scientific research and will not be used for other purposes. The provided lists have not included your name, so it does not need to be mentioned. Your participation is much appreciated.

The questions:

1- How long have you lived here?
   A- Since 1980   B- Since 1990   C- Since 2003

2- How many family members live here?
   A- Two       B- Three       C-Four

3- Do you live with you parents?
   A- Yes       B- No

4- How many families live at the same house?
   A- One       B- Two       C- Three or more

5- If Q4 is more than one, what is the reason?
   A-Economics   B-Healthy   C- security

6- Do you own or rent?
   A- Own       B- Rent

7- If you own, how are other families accommodated?
   A- Add new flat   B- Use the garden   C- Repartition the interior spaces

8- What have you done in response to the war and insecure circumstances?
   A- Repartition the interior spaces   B- Change window size /location
Urban Form and Insecurity: A case study of three districts in Baghdad

C- New building material    D- New defensive systems

9- Has your house changed as a result of war and insecure circumstances?
   A- Yes    B- No

10- Have any buildings collapsed and evacuated as a result of war and insecure circumstances?
    A- Yes    B- No

11- Have buildings changed in your neighbourhood since 2003?
    A- Yes    B- No

12- If you are a tenant, what was your rent before 2003?

13- If you are a tenant, what was your rent after 2003?

14- Where is your preferred shopping area?
    A- District Centre    B- Nearby Centre    C- Other district

15- Mode of travel (if District Centre)?
    A- walking    B- Bus    C- car    D- Other

16- Mode of travel (if Other District)?
    A- Walking    B- car    C- Public Transportation    D- Other

17- Where do you go for health services?
    A- Local clinic    B- Private Hospital    C- Public hospital

18- Where do you get your electricity?
    1- Government    2- District generators    3- Local generators

19- How do you schedule your daily activities?
    A- Hourly    B- Daily    C- Weekly

20- Do you meet your friends close to your house?
    A- Yes    B- No

21- Has the place you meet your friends was changed since 2003?
B- Yes  B- No

22- Has your daily routine changed after 2003?
A- Yes  B- No

23- Was this change a result of war or insecure circumstance?
A- Yes  B- No

24- Did your route to work, school, and etc. change after 2003?
A- Yes  B- No

25- Do precast concrete barriers restrict daily movement?
A- Yes  B- No

26- Has the war affected your daily activities?
A- Yes  B- No

27- How many cars do you own?
A- One  B- Two  C- More

28- Where do you park your car?
A- House  B- General Parking  C- Street Side  D- Other
Appendix B

The interview questions and answers

Q1- Have the forms of buildings changed since 2003?

The answers:

A- No
B- Yes (no reason given)
C- Yes/ due to modernization and communication systems (appearance of modern designs)
D- Yes/ due to change of building materials and frontages (use of concrete panels and aluminium sheets)
E- Yes/ due to interior displacement and population density which increased numbers of splintered units
F- Yes/ due to destruction and absence of conservation and refurbishment.
G- Yes/ due to weakness of regulations and absence of monitoring systems as well as financial reasons such as increase of income level and decrease of investments.

Q2- Were these changes resulted of war and security circumstances? If so, how?

The answers:

A- No
B- Yes/ due to war and terrorist acts (interior displacement) this encouraged population density.
C- Yes/ due to absence of regulations and municipal monitoring
D- Yes/ due to security measures and safety arrangements in terms of using safer and secure building structures as well as finishing materials

Q3- What were the most significant changes in building forms and designs in the above mentioned period?

The answers:

A- Change of building materials, and frontages
B- Change of traditional designs and concepts, and appearance of modern concepts

C- Disappearance of gardens and green areas as well as increase in residential density (appearance of splintered units with multi floors)

D- All of above

Q4- To what extent, have building forms and their structures been affected by the war and terrorist acts? How?

The answers:

A- Significant effects / due to security measures such as use of pre-cast concrete barriers as well as use of safer and more secure materials and designs.

B- Significant effects / due to terrorist acts and increase of interior displacement which increased population density.

C- Significant effects/ due to the weakness of regulations and municipal monitoring

D- Negligible effects / the war and terrorism have temporary effects.
Appendix C

Ministry of Municipality
Physical Planning Directorate

N/ 2380
D/ 23-9-2012

To whom it may concern

We would like to inform you that Mr. Dhyaa Molan Albayati is our employee entitled oldest engineer. He is in a scholarship to complete his doctoral studies in the field of urban planning and the subject of his study (Planning Responses in War affected cities). We wish to show him possible assistance in his research and data collection in his subject from the period 23/9/2012 to 1/12/2012. Thank ful for your cooperation with.

Prime Engineers

Ayad Salman Ali
Director of Planning Directorate

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