Let's get physical!

Influences of physical protection against terrorism on citizens and urban design

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Preface

This thesis is the end result of my study in Human Geography & Planning, specialization Urban Planning, at the Department of Spatial Sciences of the University of Groningen. Finishing my study with this thesis started in the summer of 2004, when I left for the U.S.A. for participation in the N.E.U.R.U.S. program (Network for European and United States Regional and Urban Studies) at the University of Illinois at Urbana-Champaign (U.I.U.C.). Together with Professor Edward J. Feser, who has guided me through the process of starting this research, I little by little gave meaning to my first ideas of where my research should be about. At this moment, some eight months later, I have finally completed my mission. It has been challenging; not only because of going abroad, but also writing a thesis, or even finishing my study, is more than I could have ever foreseen doing it myself. It has been an interesting, intensive and special period in my life.

In the process of writing this thesis, I have become indebted to many. Doing research and writing a thesis without any help is impossible. Therefore, I would like to thank the following people:

First of all, I am grateful to those who have helped me with the execution of my research during my stay in the U.S.A. from August till December 2004. To begin with, I would like to thank Professor Edward J. Feser from the Department of Urban and Regional Planning at the U.I.U.C. for supervising my research in the U.S.A. Also, Professor Emily Talen owes gratitude for giving me some good comments and advices. Furthermore, I would like to thank Professor Chris Silver from the U.I.U.C. for being such a great host for N.E.U.R.U.S. students. He financed our trip to the fall seminar in Portland, and made it convenient in many ways to study at the U.I.U.C.

Back in The Netherlands, Mr. Paul J.M. van Steen from the Department of Spatial Sciences of the University of Groningen has been very important in the realization of this thesis. Maybe without knowing it, he has challenged me to finish my thesis before summer. In this relatively short period he made it possible to have my concepts supervised. His cooperation, comments and advices have been critical to the success of this thesis.

Moreover, I would like to express gratitude to all the people who have helped me designing my case studies and supplying me with information and data. My conversations and/or interviews in Chicago, New York, The Hague, Rotterdam and Amsterdam were very valuable for this research. Without them, doing my case studies would not have been possible. Thank you all for your time and cooperation and sharing your knowledge with me! And, of course, I cannot forget the participants of my survey in Chicago. Thank you for your time as well.

After my period abroad, I have been fortunate enough to do an internship at KAW architects and consultants during the time of writing this thesis. They gave me the opportunity to do an internship and to work on my thesis at the same time, which was very instructive in finishing my study.

Thanks to all of my colleagues of the consultancy team for offering me interesting projects to work on, and giving me an inspiring environment to work in. Also, I owe big gratitude to Ilse and Roelof. In times of the computer controlling me, instead of me controlling the computer, you both have helped me with solving these 'little' computer problems.

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Family. Without them it wouldn't have been possible to complete this thesis, and most of all, my study. I am so grateful to my parents and grandparents for supporting me financially during the last five years, but even more important is the mental support I have received from them. They took away my uncertainties at some moments and encouraged me to continue with the things I did and wanted.

Last, but way beyond least; friends. Accompanying me during relaxing coffee breaks, or even reading parts of my research; some inputs were little, but not less important, and other can best be described as big and decisive. Thank you so much for listening to my complaining and nagging! Your support was, and still is, beyond imagination.

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Summary

In 1995, a massive bomb inside a rental truck exploded in the parking basement of the Murrah Federal Building in downtown Oklahoma City, sweeping half of the nine-story building away. It took the life of 168 persons. This incident is known as the 'Oklahoma bombing' and is, besides the attacks of "9/11", one of the most famous terrorist attacks in the world. The vehicle bomb is one of the many attack modes that may be directed against a facility or individuals. (Hinman & Hammond 1997). In the terrorism prevention and protection task it is very important to look at the protection of the targets of terrorist attacks: buildings and/or urban structures with other functions.

The vehicle bomb has much to do with design, because it causes the most material damage and causalities. It could be argued that threats even more devastating than the vehicle bomb may be conceived, such as aerial or nuclear attacks, but these threats are so structurally devastating to buildings that there is virtually nothing that can be done to mitigate the effects for civilian structures. Other threats, such as chemical or biological warfare, are neglected in this research because they do not cause material damage (Brown 1995). Because of enduring terrorist threats, it is important to look at how to protect countries and cities against possible other attacks. Protection against terrorist attacks can be found in urban planning and design. This research's goals is to explore to what degree and in which way urban design can and, according to urban designers and the general public, may help to protect buildings and/or sites against terrorist attacks. Because of the research program in which this research has been conducted, this research has been done in two countries: in the U.S.A. and in The Netherlands.

Improvement of safety is the main goal of protection against terrorist attacks. But, the implementation of fences, bollards, Jersey barriers, and also extra security measures like police patrol and cameras, can also bring along some other (side) effects. In the implementation, it is easy for cities to forget the aesthetic part and sometimes it can look like they place the protection measures haphazardly; in their way of protecting they seem to forget that buildings and/or sites can begin to look like and feel like a fortress. Protection sometimes incorporates public space; space that used to be a pavement, a cycle path or a lawn. It used to be publicly accessible, but now it is incorporated by the protection measures. Also, roads can be (partially) closed off, or parking prohibitions can be raised. This influences the way pedestrians, cyclists or car drivers can use the building and/or site and may cause feelings of dissatisfaction. The fortress-like feeling can give feelings of insecurity, instead of feeling more safe. These (side) effects diminish the quality of life of citizens. The challenge and the quest in the operation of protection against terrorist attacks in urban design are to improve the safety, and try to keep the quality of life. Therefore it is important to find a balance between safety and the quality of life.

To find out to what extent and in which way the U.S.A. and The Netherlands are implementing protection measures, case studies in Chicago, New York City, Washington D.C., The Hague, Rotterdam and Amsterdam have been done. A photographic research has been done, and where possible, interviews with responsible officers have been held to get to know more information on

terrorism protection. Also, in Chicago only, a questionnaire has been conducted to get to know more information of users of affected areas.

In doing case studies, eight different variables have been analyzed to compare the different case studies with each other. These variables are: symbolic and economic value, attention for design of protection measure, harmony with surrounding, effect for pedestrians and vehicles, creation of feelings of insecurity, and the effect for urban design.

After having done the three case studies in the U.S.A, it has to be said that there is a difference in the design of the measures between the fact if it is a city owned facility or a private owned. In case of protection measures at private owned buildings, they seem to be incorporated more into the overall design of the building and the site. Even between city owned facilities in the three cities there is a difference. In Chicago, it looks like more time and money is spend on a proper layout and design of the protection measures. To explain this, one can say that the threat for a terrorist attack is not as high as in the two other cities, who both have been the scene for terrorist attacks on "9/11". Because of that, in New York City and in Washington D.C. protection measures have been implemented rapidly and haphazardly. So, it seems that time, money and threat level can be held accountable for terrorist attack protection measures to look nice and to be in good harmony with the building they protect. That can be concluded if you look at the difference between the cities.

If you look at the protection measures itself, it can be concluded that the effects they have for users of specific buildings and/ or sites differ in the type and design of the measures. This is also a result of the site they are implemented in, what means the difference between the way people used to use the site and the way they can or have to use it now because of the implementation of the measures. Nice looking planters, or small bollards of a proper stylish material do not necessarily have to look like they are protection measures.

The three case studies in The Netherlands have shown that also in The Netherlands, the protection measures differ as they differ in being implemented to protect state-owned or private objects. Although it has never been said, it looks like the examples of private parties implementing protection measure have more money to spend on this. The measures are all incorporated into the design of the site or building properly, and do not really hinder any ones ability to move around the site or use the site freely. The two examples of 'serious' protection measures are the U.S. embassy in The Hague and the U.S. consulate in Amsterdam. This is not very remarkable, because we have learned from earlier case studies done in the U.S.A. that most of the protection measures at stake here are of a serious kind as well. The Dutch examples both incorporate public space, and have far reaching consequences for the users of these sites or buildings. Although it has not been measured or researched, accepted can be that these measures make you feel uncomfortable at least. All of these case studies in The Netherlands have also shown, just like the case studies in the U.S.A. that the effect they have for pedestrians, cyclists or car drivers, depends on the way of implementation, the design and the size. If they are integrated into to overall design of the site to a certain degree, the effect is less than if they are placed rapidly or haphazardly.

Urban design as a protection measure can surely contribute to an increase in safety. It prevents vehicle bombs from coming too close to a building and/or site. Or, it can harden the target. In the case of a bomb going off, the result will be minimized, because a hardened wall will break the blast. This increases the level of safety. However, if only one building in a row is protected by physical measures, than it will only have an effect for that particular building. Not for the whole neighbourhood or area. The neighbour will also have to implement protection measures to protect his property against terrorist attacks. And, it will have to continue like that. Implementing measures at a site and/or building will only have the wanted effect on a larger scale, if more than one building in a neighbourhood will do the same. Otherwise, the attacker will move to your neighbour.

By this means, implementing these measures will contribute to an increase in objective safety. The attacks will not have the result the attackers aim at. The protection measure reduces loss of life and property. But, objective safety is not the same as subjective safety. By implementing measures, people can also be made aware of a certain threat. Without the measures they probably would not have known that they are approaching a site and/or building at high risk of a terrorist attack. That can make them feel more unsafe. That is a difference between objective and subjective safety.

In the U.S.A. the threat is conceived as higher, also because of their history of terrorist attacks on buildings and sites. And, maybe this legitimates their way of protecting buildings and/or sites at high risk. If we look at some examples in New York City and Washington D.C. the implemented security measures do contribute negatively to the urban design of these cities. They are not really designed nicely, and can easily make people more aware of a threat. This can decrease the subjective safety. Maybe, the physical protection measures discussed in these examples could be designed better, and by this means fit better into the existing situation. If the protection measures do less look like as being protection measures, than maybe people feel less unsafe and are less aware of a present threat.

For example, a jeweller in Rotterdam has implemented stylish artful anti-ram bollards in front of his shop. They do not really look like protection measures. The threat of being attacked is far less than certain buildings on Wall Street, but the same protection measures could be implemented there as well. The Netherlands is doing well in implementing protection measures. That is obviously a consequence of a threat that is lower than is the U.S.A., but the measures that are implemented in The Netherlands look like they fit better into the overall design of the building and site. Only two examples are exceptional. In The Hague and in Amsterdam two buildings are to the utmost protected against possible attacks. They are an embassy and an consulate, from American origin.

1   Background and goal of the research

1.1   Terrorist attacks

Everybody still remembers it. In 2001, Tuesday September 11th, two hijacked planes crashed into the north and south tower of the World Trade Centre in New York, U.S.A. The two towers collapsed and several other buildings in the surroundings were in danger of collapsing or had major structural damage. On the same day, two other planes got hijacked and crashed as well, one into the Pentagon in Washington D.C. and the other in a rural town called Somerset County, Pennsylvania. In total 2749 people were killed by these terrorist attacks on "9/11" (National Commission on Terrorist Attacks Upon the United States 2004). This is by far the most famous incident of terrorist attacks in the United States, and throughout the whole world. But, it is not the only case of terrorist attacks the United States had to deal with. In 1993, the World Trade Centre in New York was a target of terrorist attacks for the first time, which demanded 6 lives and thousand of injuries. Another incident is known as 'the Oklahoma bombing'. In 1995, a massive bomb inside a rental truck exploded in the parking basement of the Murrah Federal Building in downtown Oklahoma City, sweeping half of the nine-story building away (see figure 1.1), which took the life of 168 persons (Hinman & Hammond 1997).

Figure 1.1 The Murrah Federal building in Oklahoma City after the bombing of April 19th, 1995 (source: Oklahoma Bombing Investigation Committee 1999)

Acts of terrorism as it reveals these days are not new. It is rooted in anarchism, which was at its top at the end of the 19th century with the attack on Czar Nicolas 2nd (Campbell & Flournoy 2001). In the 20th century terrorism became more and more a way for nationalistic groups to strive for independence. The most famous examples of terrorist organizations throughout the world are, because of their disastrous attacks, The Bask Separatist Movement ETA ('Euskadi ta Askatasuna'), the IRA (Irish Republican Army) and the Islamite Fundamentalist Group named Al Qaeda. As for all terrorist organizations, to reach their goals they are unpredictable and go really far. Hundreds of innocent people suffer each time from these terrorist organizations.

Whereas terrorist organizations work together to increase the effectivity of their actions, governments all over the world work together to compete these actions effectively. This attempt for cooperation goes back to 1937, when in Switzerland several governments tried to gain an international partnership in competing terrorism (Combs 1997). However, for a long time they didn't manage to reach an agreement. The main reason seems to be that different countries share different values and beliefs about what terrorism is. What from the point of view of the victims is seen as a terrorist attack, can be a righteous action in striving for freedom in the eyes of the terrorists. Only in 1977 they succeeded in

gaining a convention on a European level. One week before "9/11" the European Parliament agreed consensus about a more intensive competition against terrorism (Van Leeuwen 2003).

In the fight against terrorism it is very important to compete the source of terrorism: the terrorist organization and the terrorist itself. This is possible through improved protection measures like more police control and more security devices like cameras and entrance screenings. Filtering out tries to avoid more actions from terrorists. But, besides these ways of protection, it is also very important to look at the protection of the targets of terrorist attacks: buildings and/or urban structures with other functions. Because of improved technology and knowledge about how to use it in a correct way, we live in an era where we have the capabilities to improve those aspects of the urban landscape that cause concern. As humans, we respond to environmental cues created by the built and natural environment. Planners and designers can be held responsible for the standards, policies, and guidelines that direct the way in which our environments are designed and built; the very same environments that affect the way we behave and feel (National Capital Planning System 2002). They are trained to integrate an array of considerations into our daily practice and strive to recognize our potential impact on creating safe places. Like transportation, economics and urban design, it is worth considering public safety and terrorist attack protection measures in the development and implementation of general plan policy, design guidelines, and development review.

Protecting yourself from danger is a basic human instinct that can result in a lot of different manifestations (Jacobs 1961). Today's society is so preoccupied with safety and how to deal with terrorist attacks so as to not become a victim that we are on a seemingly limitless quest for the ultimate terrorism prevention solution. This quest is fuelled by what we constantly see and hear about terrorism on TV, the radio, the newspaper and the Internet. In the press we are confronted with "hard" news about terrorism, where the biggest issue is how to defeat the terrorists. But, because of enduring terrorist threats, it is even more important to look at how to protect countries and cities against possible other attacks. Protection against terrorist attacks can be found in urban planning and design. That's what this research is about.

1.2   Dealing with terrorist attacks: a planner's perspective

Planners and designers started to think about the idea that modification of the physical environment could have an impact on crime by eliminating opportunities for crimes to be committed, starting with Jacobs' *The Death and Life of Great American Cities* (1961), Newman's *Defensible Space* (1972) and Jeffrey's *Crime Prevention Through Environmental Design (1977)*. Today these principles could also work for the protection of terrorist attacks. The idea is that in some cases the physical environment could be held accountable for the succeeding of some of the terrorist attacks and undesirable activities occurring in cities and its downtowns and that some disasters could have been prevented if only more protection was provided for a certain building. This concept is known as target hardening.

After "9/11" the U.S.A. has established a 'National Commission on Terrorist Attacks Upon the United States', which has formulated a 'Global Strategy' for protection against terrorist attacks. One aspect of this strategy is protection of the targets of terrorist attacks, which include urban structures. This is known as target hardening. Today, especially after "9/11", Americans live with a heightened awareness of how weak their safety can be and their trust in the stability of the public environment can suddenly be shaken as security is diminishing. Citizens, therefore, may expect increased protection for themselves and for their environment (National Capital Planning System 2002). Washington D.C., with federal facilities like the White House and the U.S. Capitol, has already been protected for many years, which increased after "9/11". Temporary barrier blocks and other fortifications have become familiar in the streetscapes of Washington D.C. Unfortunately at the expense of the openness, accessibility and comfort within the public domain (National Capital Planning System 2002). Therefore, an 'Urban Design and Security Plan' has been developed for Washington D.C. (see figure 1.2). The idea is that urban design and good security can exist together.
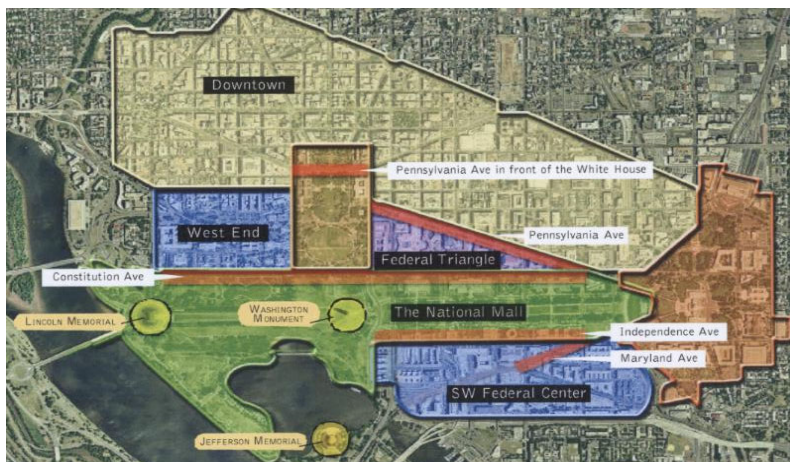
Figure 1.2 The different protection areas of Washington D.C.
(source: National Capital Planning System 2002)

While the plan applies to federal facilities and has been prepared specifically for Washington D.C., its principles can also be applied to other cities. The illustration of Washington D.C. is just an example of a city which has incorporated terrorist attack protection measures into urban design. It happens in more cities throughout the U.S.A., and also countries in Europe have to deal with this already for a long time, due to attacks by ETA and IRA.

1.3   The vehicle bomb as research objective

Bombings are one of the most traditional ways to commit acts of terrorism. The vehicle bomb is only one of the many attack modes that may be directed against a facility or individuals. Some other forms of attack include mob attack, kidnappings, poison gas attack, sniper attack, and mail bombs (Hinman & Hammond 1997). However, from the standpoint of urban design, the large-scale vehicle bomb has much to do with design, because it has caused the most material damage and causalities.

The blast from a vehicle bomb produces high, relatively uniform pressures and impulses over a large area of adjacent structures. This loading can result in collapse of nearby structures. Such an explosion produces extensive glass breakage. A confined explosion, such as one in a parking garage or basement (as happened in the case of the Oklahoma bombing), can result in catastrophic collapse of the

structure through the effects of the direct blast loading and the quasi-static pressure developed in the closed space (Conrath 1999). Vehicle bombs have an additional advantage of being able to bring a large quantity of explosives to the doorstep of the target, undetected. Finally, the dramatic component of explosions, in terms of the destruction they cause, creates a media sensation that is highly effective in transmitting the desired message of the terrorist to the public.

It could be argued that threats even more devastating than the vehicle bomb may be conceived, such as aerial or nuclear attacks, but these threats are so devastating to buildings that there is virtually nothing that can be done to mitigate the effects for civilian structures. Other threats, such as chemical or biological warfare, are neglected in this research because they do not cause material damage. Although it is possible that the threat may change in the future, bombings have historically been a favourite tactic of terrorists for a variety of reasons, and they are likely to continue in the future (Brown 1995).

1.4   The problem

Improvement of safety is, of course, the main goal of protecting against terrorist attacks. But, the implementation of fences, bollards, Jersey barriers[1], and also extra security measures like police patrol and cameras, can also bring along some other (side) effects.

In the implementation, it is easy for cities to forget the aesthetic part and sometimes it can look like they place the protection measures haphazardly; in their way of protecting they seem to forget that buildings and/or sites can begin to look like and feel like a fortress. Protection sometimes incorporates public space; space that used to be a pavement, a cycle path or a lawn. It used to be publicly accessible, but now it is incorporated by the protection measures. Also, roads can be (partially) closed off, or parking prohibitions can be raised. This influences the way pedestrians, cyclists or car drivers can use the building and/or site and may cause feelings of dissatisfaction. The fortress-like feeling can give feelings of insecurity, instead of feeling more safe. These (side) effects diminish the quality of life of citizens. The challenge and the quest in the operation of protection against terrorist attacks in urban design are to improve the safety, and try to keep the quality of life. Therefore it is important to find a balance between safety and the quality of life.

1.5   Research goal and questions

This research has been conducted as part of the N.E.U.R.U.S. program. N.E.U.R.U.S. stands for 'Network for European and United States Regional and Urban Studies' and is an exchange program between three European universities and three American universities. The idea for this research is originated during a period abroad from August till December 2004 at the University of Illinois at Urbana-Champaign. One of the goals of this exchange program is doing a comparative research between the host and home country, respectively the U.S.A. and The Netherlands.

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[1] Jersey barriers are concrete traffic dividers used on freeways and road construction sites to separate and direct vehicle traffic. There are several types of traffic barriers, but Jersey-style barriers are the most commonly used (Roads to the Future 1997).

This, basically descriptive, research gives a closer look on how terrorist attack protection measures are being incorporated in urban design principles, in the U.S.A. and in The Netherlands.

Accompanied with this research is the following goal:

The goal of this research is to explore to what degree and in which way urban design in the U.S.A. and in The Netherlands can and, according to urban designers and the general public, may help to protect buildings and/or sites against terrorist attacks.

From this goal, the following questions, which will be the lead during this thesis, can be identified:

1. What can be done in urban design to protect buildings and/or sites against terrorist attacks, and what has already been done?
2. What, according to urban designers and the general public, can and may be done to protect buildings and/or sites against terrorist attacks?
3. How do users of affected areas regard these terrorist attack protection measures?
4. How can, all in all, urban design as protection measure contribute to an increase in safety?

1.6   Research methodology

Beforehand the methodology of the research will be explained, it must be said that terrorism here is seen as something invariable. Not all attacks have been done for the same reasons and with the same ideologies, but most of the time, the effects of doing it are the same. It is clear that every time many people have to suffer. So, this research does not pay attention to the reasons why the several attacks have taken place, but it will look at the situation after the attacks, the outcome, assuming that terrorist attacks take place. The research methodology can be divided into four phases.

The first phase is the period of reading about the subject and designing the research during the first two months in the U.S.A., and the second phase is the period of the actual research on the part that has been accomplished in the U.S.A., the last two months of the stay abroad. Phase three is the period of doing research on the part about the Netherlands, and phase four encompasses analysing of the data and writing of the report. Phase three and four occur more or less at the same time. These phases will be outlined below:

Phase 1

The preparation of the research actually means a thorough literature review in the U.S.A. to get acquainted with the subjects of terrorism protection and target hardening. Almost all the literature has been collected in the U.S.A., since the University of Illinois had a lot more literature and knowledge concerning this study its topic. Also, designing the case studies has been done during the first phase.

Phase 2

This phase comprises the actual research that has been done in the U.S.A. This means doing an extensive photographic research in Chicago, Washington D.C. and New York, to get familiar with the

concepts in reality; the first steps in the 'field'. The unit of analysis of the photographic research that has been done in all three cities, is the actual terrorist attack protection measure, which has its sediments in urban design.

The execution of the extensive case study has been done during this phase as well. In the city of Chicago interviews have been executed with architects of the City of Chicago Department of General Services and the Public Building Commission, to get to know more information from the officers who are responsible for the implementations in practice. Also, a questionnaire has been composed and conducted to get to know more information from a very important actor in this research topic: the users of affected areas. This questionnaire answers the question what the effects are of the implementation of terrorist attack protection measures for the users of affected areas. This questionnaire has been done among users of the Sears Tower site, in the Loop, downtown Chicago. Difference has been made between people who live and work around this site day by day and people who visit this site as a tourist only once. The question form can be found in the appendices (A).

Phase 3

In the third phase research on the Dutch part has been done. In the three biggest cities in The Netherlands, Amsterdam, Rotterdam, and The Hague, a photographic research has been done. To get to know more information about terrorist attack protection measures in The Netherlands, interviews/discussions with officials from the municipalities have been executed. Discussed is the situation in The Netherlands, and questioned is the forecast of the same protection measures as can be seen in the U.S.A. The interviews/discussions are partially based on a selection of photographs taken in the U.S.A.

Phase 4

The final phase has existed out of analysing the data to write the thesis, which has taken place in Groningen, the Netherlands. Also, the comparison between the U.S.A. and The Netherlands, regarding the research question, has taken place, and important lessons to be learned have been identified to see whether the U.S.A. can learn from experience from The Netherlands or vice versa. Altogether this has led to the completion of this report. Further contents of the different chapters will be described in the following paragraph.

1.7   Reading guide

The contents of this thesis follow the different phases in which this research has been done. The next chapter (theoretical framework) describes the theoretical framework in which this study must be seen and has been executed. Among other things, the theory of Defensible Space and the concept of Crime Prevention through Environmental Design (CPTED) will be defined. This is meant to understand the concepts where this research has to deal with and provides the context wherein the central problem in this research has originated.

Chapter three will bring up the basic principles in the field of urban design to protect urban structures against terrorist attacks, altogether with the underlying thoughts and a broader context in which these protection measures are being taken. Explained will be the concepts that can be found in practice. How can they be implemented and how does it function?

Chapter four will present the methodology which will be the guide for doing the case studies in chapter five and six.

Chapter five and six will look at this kind of terrorist attack protection measures in practice in respectively the U.S.A. and in The Netherlands. It will result in two overviews of the photographic researches that have been accomplished in the two countries.

In chapter seven, the U.S.A. and The Netherlands will be compared with each other based on the same variables. These are the extend to where terrorist attack protection measures are being implemented, and the influences they have for the users of affected buildings and/or sites. Also, some recommendations for either the U.S.A or The Netherlands will be given and conclusions will be drawn to answer the research question.

2   Theoretical framework

In trying to get a better understanding of the research topic, and to finally answer the research question, here the focus is on the theory of Defensible Space, which originates from Oscar Newman (1935-2004). According to this theory a city can defend itself physically against crime. Because of the research topic, it is worthwhile to see if this theory also counts for a city defending itself physically against terrorist attacks. Does it share the same underlying thoughts? Together with the highlighting of a few ideologies drawn from a relevant literature review, in this chapter the theoretical framework of Defensible Space, in which this research has been conducted, will be given.

2.1   Background of the theory

The type of architecture can be held accountable for the fact that some buildings and neighbourhoods are more likely to produce an environment of crime, than other ones. To underline that statement, we have to go back to the period of modern architecture, first appearing at the beginning of the 20th century. According to Oscar Newman and Jane Jacobs (1916), one can say that structures, neighbourhoods or villages of modern architecture, can be seen as a type of architecture that is unsafe.

2.1.1   Le Corbusier

In the period of the modern architecture, Le Corbusier (1887-1965) and the International Congress of Modern Architects (C.I.A.M.) flourished, and the keyword seemed functionalism. The encyclopaedia says that modern architecture "rejected historic precedent as a source of architectural inspiration and considered function as the prime generator of form, employing materials and technology indirectly, rather than softening with ornament or façade" (Wikipedia; The Free Encyclopedia 2005).

Le Corbusier was an influential architect mainly through his writing and his buildings, and although he did not really have architectural skills, his ideas on urban living strongly influenced post-war reconstruction. He had a strong opinion that the 20th century would be an age of progress, an age with engineering and technological advances, and new ways of living (Le Corbusier 1931). Only architecture did not go along with his ideas, as new creations kept being built in various historical styles. By 1918, his ideas on how architecture should meet the demands of the machine age led him to develop a new theory: 'Purism'. Purist rules would lead the architect always to refine and simplify design, without ornaments. Architecture would be 'as efficient as a factory assembly line' and 'a house is a machine for living in' (Le Corbusier 1931). Despite his love for machine aesthetic, Le Corbusier was determined that his architecture would reintroduce nature into people's lives. Victorian cities were chaotic and dark prisons for many of their inhabitants. He was convinced that a rationally planned city could offer a healthy, humane alternative (Curtis 1986). The *'Ville Contemporaine'*, stemming from 1922, is the first example of the effect of his ideas.

After World War II, Le Corbusier got his chance to put his urban theories into practice, because Europe had big housing problems. The *Unite d'Habitation* in Marseilles (1952) is a connection of three decades of Corbusian domestic and urban thinking. It had seventeen levels were 1600 people could live and it incorporated various types of apartments, shops, clubs and meeting rooms all connected by

raised 'streets'. Now a popular building for Marseille's middle-class professionals, this 'functional city' was an example for solving many housing problems all over the world (Curtis 1986). But later in the 1950s, this form of architecture and planning came under severe criticism; the first signs of defeat of the modern movement. Influenced by Le Corbusier's modernist vision of the Garden City, public housing projects are characterized by clusters of dominating high rises with large amounts of open space on super blocks closed to traffic, with little connection to the surrounding urban landscape. Green space around buildings is unbounded and undifferentiated, opening up to public streets and unrelated to a particular portion of a building or cluster of buildings (Newman 1972). The large green spaces on the ground were intended to provide a garden or park-like atmosphere filled with trees that would reconnect the resident to nature and provide space for community activity. The reality of the space in practice was that the grounds were not kept; they filled with glass and garbage, and were taken over by gangs and other criminal elements. Because too many families share the space, there is no sense of ownership or territoriality to protect and monitor the space (Newman 1972).

After Le Corbusier died in 1965, the accumulation against modernism grew. Local authorities on tight budgets, which often failed to understand the essential humanism (creating communities) behind Le Corbusier's plans, copied his theories on urban renewal (Curtis 1986).

2.1.2 Jane Jacobs

Jane Jacobs had a strategy that was the opposite of the one from the urban planners from that age. Instead of the utilization of ideals to shape the future, she studied the real successes and failures, drawing on her experience of living in New York and working as an architectural journalist. Her book '*The Death and Life of Great American Cities*' (1961) was an attack on large-scale urban planning and a strong critique of the urban renewal policies of the 1950s which, she claimed, destroyed communities and created isolating, unnatural urban spaces. She drew attention to the tendency for crime to occur in the large publicly accessible areas created by the newer forms of planning well away from conventional streets, and she stressed the role of urban design and its role in community safety (Jacobs 1961). One of her targets was the abandoning of the traditional relationship of houses, sidewalks and street and its replacement with high-rise apartment blocks set in 'parks' along the lines of Le Corbusier's 'Radiant City' thought up in the 1920s.

Essentially, her criticism of new forms of design was that they broke down many of the traditional controls on criminal behaviour; the ability of residents to watch the street and the presence of people using the street both night and day. Jacobs noticed that streets, which are isolated, unused, and non-functional, are unsafe streets, whereas streets that have both residential and commercial use twenty-four hours a day are safe streets. Streets that have pedestrian and vehicular traffic, which have small shops and cafes open late at night, and which have residents living in apartments overlooking the street level are safe streets. Because they have multiple purposes, such streets have eyes. People must have some reason for using the sidewalks; otherwise they stay indoors (Jeffery 1971). She supported dense, mixed-use neighbourhoods as found in traditional American cities. Its versatile traffic flow provides a social and politic correlation, which contributes to the construction of an interconnected neighbourhood; a neighbourhood that is self-regulating, regulated by a web of informal agreements (Jacobs 1961).

If people are afraid, they remain inside behind locked doors, and such withdrawal increases the isolation of the streets and thus increases the crime rate. A vicious cycle is created whereby crime forces people to stay off the streets and out of the parks, and non-use of streets and parks results in a further increase in crime. In an era when urban renewal meant razing neighbourhoods to build high-rises, she argued for cities on a human scale, for foot traffic, for safe streets protected not by heavy police presence but by the "eyes of the city": neighbours keeping an eye on one another.

2.2 Defensible Space theory

2.2.1 Oscar Newman

Oscar Newman, architect and city planner known for his work in crime prevention, has developed the theory of Defensible Space, which helps neighbourhoods redesign physically for greater safety. Newman's target was similar to Jacob's but the intervening years had enabled him to research some of the problems of housing design and crime. He convinced many that the form of modern buildings might have something to do with the increase in crime (Poyner 1983).

The concept of Defensible Space evolved some 30 years ago, when he witnessed the decline of the newly constructed Pruitt-Igoe public housing high-rise project in St. Louis, U.S.A. Its design followed the planning principles of Le Corbusier and the C.I.A.M.-movement (see figure 2.1), and was hailed as an example of the new enlightenment. Residents were raised into the air in 11-story buildings to keep the grounds and the first floor free for community activities. The buildings had communal corridors on every third floor to house laundry, storage, garbage, and communal rooms (Newman 1996). This new phenomenon brought many unanticipated problems. They are particularly vulnerable to high rates of crime. The physical characteristics of large developments allow criminals to use undifferentiated space and spaces with low visibility to attack victims. A majority of residential burglaries occur in areas of low-income or poverty-ridden areas, and low socio-economic status and weak family-ties are strong indicators of crime.

Figure 2.1 Overall view of Pruitt-Igoe, a public housing project constructed in St. Louis in the 1960s (source: Newman 1996)

The physical factors that correlate most strongly with crime rates are, in order of importance: the height of the buildings, which in turn correlates highly with the number of apartments sharing the entry to a building; the size of the housing project; and the number of other publicly assisted housing projects in the area. The overwhelming sizes of the projects are not to human scale and are difficult for residents and communities to feel a sense of ownership over (Newman 1996).

According to Newman (1996), defensible space creates "the physical appearance of a social fabric that defends itself". It is a sense of ownership, an act of drawing boundaries, and outlining or delineating acceptable behaviour within the public and private intersections. Through community and personal action, people can begin to identify their space and how it is defensible.

Concern over high crime rates in communities and neighbourhoods has made the theory of Defensible Space more interesting. It operates by subdividing large portions of public spaces and assigning them to individuals and small groups to use and control as their own private areas. It does not automatically oust the criminal; it just renders the criminal ineffective (Newman 1996). Reducing crime for the safety of the community and its residents is difficult. Criminologists have developed various theories of crime, and different management strategies have been tried over the past few decades to decrease this pervasive problem. One method of crime prevention that is becoming more prevalent as a tool in combination with other abatement strategies is Crime Prevention Through Environmental Design (CPTED) (Newman 1972).

CPTED blends three main strategy areas to decrease crime to first deter criminal activity and then to promote access and legibility for enforcement. All of these methods are applicable to public housing projects (Poyner 1983).

CPTED strategies are organized into three categories:

1. Access control

Access control's main aim is to decrease crime opportunity by denying access to a target and increasing perception of risk by offenders.

2. Surveillance

Surveillance strategies include increasing police patrol, improving lighting inside building lobbies, stairwells, fire exits, hallways and other public and semi-public areas and natural surveillance techniques like increasing the size and number of windows in units and facing units onto the street and other public areas, close to the ground to increase "eyes on the street" (Jacobs 1961).

3. Territorial enforcement

Territoriality as a strategy refers to the creation or expansion of the sphere of influence an individual or a community has over physical space. This is a fundamental notion in environmental psychology, and is the foundation for Newman's Defensible Space theory (Newman 1972).

Examples of using territoriality to secure space usually means dividing and reassigning public space to communities to maintain, personalize and use (see figure 2.2). This increases the perception of risk for criminals and reinforces place attachment and social ties to community for residents (Newman 1972).

BEFORE   **AFTER**

Figure 2.2 Before and after photographs of an area where the concept of Defensible Space has been implemented. The original layout provided no grounds in the front of units for individual residents. In the site redesign, the central green area, which was largely neglected, was removed and residents were given their own front yards, which they quickly improved (source: Newman 1996).

The National Crime Prevention Council (2002) defines crime prevention as "the anticipation, recognition, and appraisal of a crime risk and the initiation of action to remove or reduce it." To contribute to this end, planners and designers must understand where they can have an impact. Newman (1972) has long known that three elements must be present for a crime to occur: desire, ability, and opportunity. Assuming that the criminal behaves in a rational way, he or she must have both a desire and the ability to carry out a crime; and, favourable opportunities must be present to facilitate the criminal's desire and ability. Planners and designers have a direct role in affecting this integral part of the crime triangle. They have the know-how and influence to alter the physical environment in ways that reduce or prevent opportunities for terrorist attacks to occur.

Environmental design in conjunction with the theory of Defensible Space uses a different method to controlling criminal behaviour and public safety than previous systems. Instead of approaching crime by looking for and correcting its root causes, environmental design attempts to eliminate or reduce the opportunity of a criminal to commit an offence, or denies access to crime targets by modifying physical space. While the relationship between the design of the built environment and human behaviour is complex, and the direction of causality is sometimes unclear, concepts from this discipline can be applied to create safer and less fearful places (Newman 1996).

2.2.2 Criticism on the Defensible Space theory

Critics of the Defensible Space theory argue that causal links between defensible space modifications and reductions in crime has never been demonstrated. According to Wekerle & Whitzman (1995), 'design never operates independently of wider social and management factors'. Newman focused on public housing environments. His emphasis on creating a sense of territoriality and controlling access to strangers by cutting up common space or privatizing it, cannot be applied to urban public spaces that must be accessible to large numbers of people. CPTED initiatives also does not deal with fear of crime and the substantial variations of fear of crime found among different groups. It focuses primarily on reducing property crimes; there is no acknowledgement that violent crime prevention in urban public space may require different measures (Wekerle & Whitzman 1995).

Also, another way of reasoning has been made by Taylor (2002). He argues that extensive work in interior and exterior spaces highlights how different groups of people use the same space, or physically similar spaces, in different ways. In the case of crime specifically, social, cultural, and economic factors almost always have far stronger impacts on how much crime is taking place in a environment, than design features. So, he says, if the theory of Defensible Space is assuming that design is the pre-eminent influence on the outcomes of interest, and therefore certain design changes are both a necessary and sufficient condition for prevention, it is incorrect. Empirical work has shown that design does not have the strongest connection with crime, when compared to social, cultural, or economic factors. Design-crime connections are conditioned by context and highly malleable. In the case of Defensible Space, undefended defensible spaces have been noted (Taylor 2002).

Newman argued that anonymous and large physical environments asked for insecurity, mostly because these environments should implicate a lack of social functioning. Like Jacobs, who argued for an architectural development with as much 'eyes on the street' as possible, he suggested that a bigger blend of ground exploitation, with a lot of different functions, shall lead to more social functioning and because of that less insecurity and feelings of insecurity.

The first thought (increased social functioning would lead to a decrease in insecurity) is worthwile to strive for, but that does not mean that is works like that. It does not require a lot of empathy to think about downtowns and their crime rates. It may be accepted that, unless reasonably good social functioning, downtowns are still the stage for acts of crime. However, his second thought (increased social functioning would lead to a decrease in feelings of insecurity) is really worth considering. Only decreasing feeling of insecurity is already a good reason for implementing concepts of Defensible Space. This is the difference between objective and subjective safety.

Awareness of the disadvantages may help to be more critical to the theory, but the disadvantages do not reject the theory as a whole. Knowing and understanding all of the critics, this study still uses the theory of Defensible Space, because the essence of it, 'creating a climate of safety by designing a physical environment', is what counts for terrorist attack protection measures as well, which we will see in the following paragraph.

2.3   Crime versus terrorism

Defensible Space and CPTED are planning processes, as compared to fortressing or target hardening (Atlas 1999). The emphasis is on structuring the physical layout of space so that its residents are able to establish a sense of ownership and control over common areas in the community. Both of these proactive approaches to crime prevention have merit; designers should carefully evaluate the unique requirements of each design problem to identify the most appropriate strategy.

They are crime reduction techniques that have several key elements applicable to the analysis of building function and site design against physical attack. It is used by architects, city planners, and landscape designers with the objective of creating a climate of safety by designing a physical environment that positively influences human behaviour. It is justified to use the theory of Defensible Space (and CPTED), because it is often entwined with terrorist attack protection measures. Many antiterrorist design approaches are similar to those found in CPTED (Atlas 1999).

Terrorism brings along a real threat for almost every country and its inhabitants. The terrorist acts are of a totally different kind than they used to be. Nowadays people have the availability of knowledge and materials to commit a terrorist attack. Knowledge about bombs has grown to such a degree that almost any terrorist or criminal can find out the information to build a bomb to carry out their acts.

Yet, with all of the catastrophic effects of terrorism in the past and the huge potential for damage in the future, acts of terrorism are relatively infrequent (Atlas 1999). The damage it brings is less than loss of life and property from crime. Designing against the threats and vulnerabilities of crime and terrorism is necessary and useful. In designing against terrorism or crime, the threats and vulnerabilities need to be assessed. The first step is to evaluate the assets that are to be protected. Usually the assets of our buildings are PIP, which stands for People, Information and Property. The threats are the potential for losses of the assets. The vulnerabilities are the weaknesses, shortcomings, or perception of risk of attack by the actuality of crime or terrorism (Atlas 1999).

Crime Prevention Through Environmental Design (CPTED) can make a difference in preventing acts of terrorism. It emphasizes problem seeking before rushing into problem solving and starts with the threat and vulnerability analysis to determine the weakness and potential for attack. Attack from criminal behaviour or attack from terrorist activity only reflect a change in the level and types of threats. The process and challenges are the same (Atlas 1999).

However, there is still a little difference between protecting against terrorism at one side and crime at the other side. The chance of being a victim from terrorism is not so big, while the potential for loss is very large. The protection measures against terrorism are of a different kind than the ones of normal crime prevention. Terrorists are not 'normal' criminals: their goals, their willingness to sacrifice innocent lives, and their willingness to die in their attacks make them extraordinary criminals, against whom extraordinary measures must be taken if security is to be achieved and maintained (Combs 1997). The probability for being a victim of crime is quite high, yet the individual loss may be perceived as small. Yet, the collective loss from crime is big on the costs to society. Protecting people, information, and property is a high priority for all buildings and/or sites, and designing for crime may reduce the opportunity for acts of terrorism.

The question is to what extent the theory of Defensible Space can be applied to the measures taken to protect cities, neighbourhoods, sites or buildings against terrorist attacks, the topic of this research. The basic assumption is that Oscar Newman has developed his concepts for the prevention of crime. Crime prevention is about reducing or preventing the opportunity for a criminal to commit a crime, by altering the physical environment. And that is exactly the same as what planners and designers mean with terrorist attack protection measures, they want to reduce the opportunity for terrorists to attack a certain buildings or other urban structure, by preventing them for coming too close to that certain building and/or site. They want an environment that is safe and pleasant for citizens to live in, and at the same time, to the utmost protected against terrorist attacks. Finding a balance between this safety and quality of life is the challenge. At the end, a 'space' that is defensible in total by itself is desirable.

3   Terrorist attack protection measures

After having described the theories of a physical environment defending itself against terrorist attacks in the previous chapter, the principles of different security measures and the terrorist attack protection measures will be described in this chapter. Attended will be which physical protection measures can be used in the protection against terrorist attacks and how they are being implemented in the regular security task. But, before these protection measures will be outlined, first will be explained how nations and individuals assess the potential threat of terrorism. Namely, before terrorist attack protection measures are being and can be implemented, one has to assess a certain threat. That is the motive for ultimately implementing protection measures.

3.1   The assessment of terrorist threats

How do nations or individuals decide which of their operations or activities are likely to be victims of terrorist attacks? Three types of indicators are being used to assess the potential threat of terrorism. These can be described as general threat indicators, local threat indicators, and specific threat indicators (Combs 1997). This threat assessment will provide a facility designer the design criteria for threat against a facility. They will know how high the threat is, and what and in which way needs to be protected.

3.1.1   General threat indicators

General threat indicators are used do determine whether, within the nation or state, conditions exist which might stimulate or provoke terrorism. Such indicators are extremely general, and are consequently of little use in predicting the likelihood of a specific terrorist attack.

Instead, they are used to assess the climate (political, ideological, religious, etc.), which might influence the willingness of a portion of the population to resort to terrorism (Combs 1997). Politically, for example, the presence of an unpopular, repressive, or corrupt government is considered a positive indicator of the probability of terrorism. Similarly, an economic climate, which includes extreme poverty and high unemployment, is regarded as conductive to terrorism.

This does not mean that any nation or region possessing these political or economic conditions will necessarily have a large degree of terrorism. It simply means that the presence of such conditions makes the likelihood of terrorism greater in such places than it might be in areas that do not have similar political or economic climates. These are indicators only, not predictors of terrorism.

3.1.2   Local threat indicators

Local threat indicators are used to assess more specific and localized possibilities for terrorism. Usually, such indicators focus on the 'deviations' on the local level, and the degree of violence involved in the expression of this 'deviation' (Combs 1997). The formation of radical groups; reports of stolen ammunition and explosives; violence against local property or against individuals; and the discovery of weapon, ammunition, and explosive caches are all considered to be local threat indicators. Again, this does not mean that any radical group must necessarily be a terrorist threat or

that any demonstration against a government or a company must be the lead up to a terrorist attack. These are just some indicators of the possibility of terrorism in a particular location.

3.1.3   Specific threat indicators

Specific threat indicators are used to evaluate the vulnerability of a particular target to terrorism, not the likelihood of terrorism in a nation or neighbourhood. These indicators include such things as the history of attacks on similar targets, the publicity value of the target, the target's access to infiltration, its counter-terror capability, its communications capability, the tactical attractiveness of the target, and the availability of the police or other security personnel.

None of the three types of indicators can be said to 'predict' the probability of a terrorist attack. Nevertheless, government and industry are beginning to rely increasingly on such indicators to help them decide what, if any, terrorist threat exists, and what direction such attacks might take (Combs 1997).

3.2   Types of security

After the just mentioned terrorist threat assessment the potential targets are being selected and in this way become a target of security. Creating an effective security system, which protects against a wide range of terrorist attacks is a difficult task. Implementing security can be done with at least two aspects to the situation: operational security and physical security; the object of this research.

3.2.1   Operational security

Operational security has as its objective: 'the denial of opportunity for terrorists to collect information on either the facility or its activities that might enable them to predict those activities' (Combs 1997).
To be able to predict those activities would help the terrorists to successfully penetrate the facility or activity to disrupt or destroy it. By denying that information to terrorists, the risk for terrorists carrying out an attack against the activity or facility significantly increases.
Prediction of operational activities usually relies on behavioural patterns, so operational security analysis focuses on identifying those patterns and how they are communicated to personnel. Emphasis is placed on making such patterns less predictable, randomizing activities as far as possible without creating chaos within the organization (Combs 1997). Too often, repeated activities create in the minds of the individuals responsible for security numbness, a lack of alertness to small differences that may be crucial. The arrival of a particular car at the same time every morning can deaden the alertness of personnel to such factors as the identity of the driver as the presence of an authorized person in the vehicle. It requires human intervention. Examples of operational security measures are: guards, sensors, closed-circuit television, and other electronic devices (Conrath 1999).

3.2.2   Physical security

Physical security has as its objective: 'the hardening of the target against which an attack may be made' (Combs 1997). It is strongly dependent upon operational security. Fortress walls, fences, and

gates are not, in modern times, either reasonable or sufficient protection against determined terrorists. The operation of the facility itself must be secure, and its personnel well trained in security procedures, in order to be properly protected against terrorist attacks. Also called passive security, it does not require human intervention. Examples of physical security are: barriers, bollards, planters, and structural hardening (Conrath 1999).

To have a balanced design, both types of measures need to be implemented into the overall security of a facility. One should remember that any security system is only as strong as its weakest link (Conrath 1999). Architects and engineers can contribute to an effective physical security system which not only augment the operational security functions, but also simplifies them. For instance, by providing a design that accommodates the inspection of pedestrians and vehicular traffic. Because of the interrelationship between physical and operational security measures, it is imperative for the owner and security professional to define early in the design process what extent of operational security is planned for various threat levels.

3.3   The implementation of physical security measures
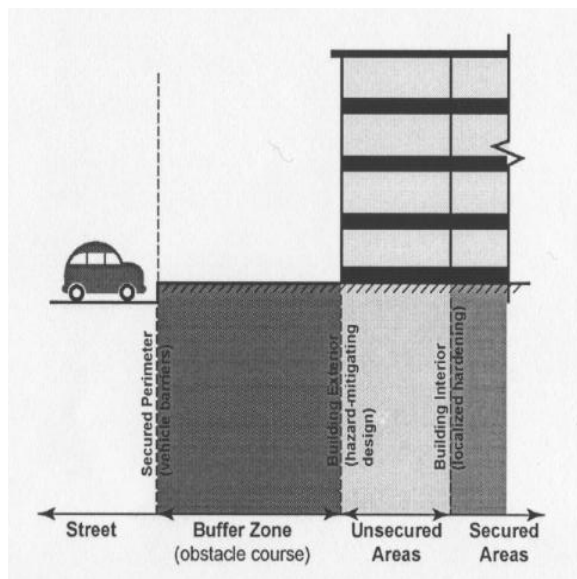
An effective way to implement security is to create different layers. Difference can be made between the perimeter line of the facility, the approach zone to the facility, the building exterior, and the building interior (see figure 3.1). The result of all of these different layers is "designated security zones" (Dixon 2003). These zones, which normally include buildings and public spaces adjacent to potential targets, such as the blocks immediately surrounding courthouses, require increased investment to harden buildings or undertake other measures to limit damage and loss of life that might result from an attack on a nearby target.

Figure 3.1 The different layers of security
(source: Federal Emergency Management Agency 2003a)

3.3.1   Perimeter line

It is the outermost line that can be protected by the security measures provided by the facility. In design, it is assumed that all large-scale explosive weapons are outside this line of defence. This line should be defended by both physical and operational security methods. It is recommended that the perimeter line is located as far as is practical form the building exterior (Conrath 1999). This is an effective way to limit the damage to buildings. If the distance from the building to the explosive source can be doubled, the overpressure is reduced by roughly a factor of eight.

3.3.2 Approach zone

The approach zone refers to controlled access to the facility through the perimeter line. Architects and engineers can accommodate security functions by providing adequate design for these activities, which makes it difficult for a vehicle to crash onto the site. This may be done through the use of barrier walls and other devices. The most visible response to "9/11" for most people has been the introduction of airport-like security measures at entrances to city halls, major office buildings, and other important buildings and spaces. Perhaps less obvious has been the closing of many entry points to create single points of entry and exit that can be monitored efficiently. A quick increase in the number of buildings that limit entry points and monitor all the people who enter, has been the most visible change in access control since "9/11".

3.3.3 Building exterior

At the building exterior the focus shifts from delaying the intruder to mitigating the effects of an explosion. The exterior envelope of the building is the most vulnerable to an exterior explosive threat because it is the part of the building that is closest to the weapon. It is also a critical line of defence for protecting the occupants of the building.

3.3.4 Building interior

Building interior can be divided into two categories: the functional layout and the structural layout. As for functional layouts, public areas such as the lobby need to be separated from the more secured areas of the facility. The impact on a building's structural integrity that would result from detonation of a weapon in the public areas, and spaces next to the exterior walls and on the lower floors need to be examined by designers (Conrath 1999). One way of protecting the occupant is to place stairwells or corridors beside the exterior walls instead of office spaces, thus providing a buffer zone.

Figure 3.2 Schematic record of the unit of analysis
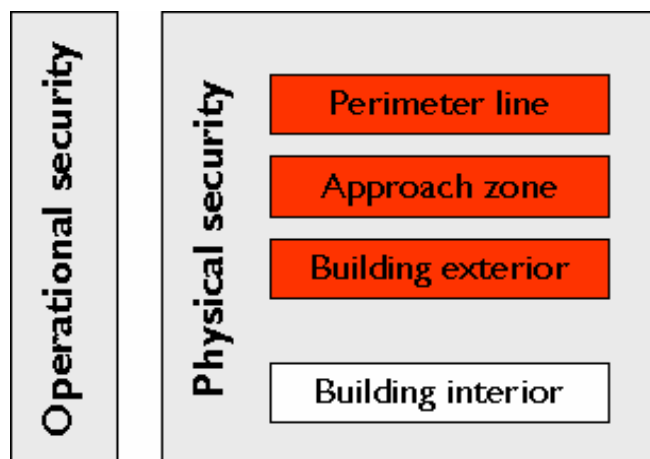
This study focuses on the physical security measures, and in particular the first three layers of security: the perimeter line, the approach zone, and the building exterior. Those three layers together form this study its unit of analysis (see figure 3.2). They have a direct impact on the city its façade. Those security measures can be seen from the streets and can influence the way people see or use the city and its streets.

3.4 Examples of physical security

3.4.1   The objective of measures

The objective of physical security measures is not to create a bunker or a bombproof building, which would be impractical for commercial structures, but instead to find practical, cost-effective measures to mitigate the effects of an explosive attack (Conrath 1999). The objective is to make the potential terrorist act so difficult that the amateur is defeated and the professional finds the cost too high. The physical security measures are 'hardening the target', which involves efforts to make targets less accessible, and by this means create conditions under which it would be impossible for terrorists to successfully attack critical targets (Kupperman & Trent 1979). Hardening the target is synonymous with establishing barriers. The goal of the designer is to reduce the risk of catastrophic structural collapse, thus saving lives and facilitating evacuation and rescue efforts. If properly implemented, physical security measures will contribute toward the following three goals (Federal Emergency Management Agency 2003a):

1. Preventing an attack

By making it more difficult to implement some of the more obvious attack scenarios (such as a parked car in the street) or making the target appear to be of low value in terms of the amount of sensation that would be generated if it were attacked, the would-be attacker may become discouraged from targeting the building.

2. Delaying the attack

If an attack is initiated, properly designed landscape or architectural features can delay its execution by making it more difficult for the attacker to reach the intended target. This will give the security forces and authorities time to mobilize and possibly to stop the attack before it is executed.

3. Mitigating the effects of the attack

If these precautions are implemented and the attack still takes place, then structural protection efforts will serve to control the extent and consequences of damage. In the context of the overall security provided to the building, structural protection is a last resort that only becomes effective after all other efforts to stop the attack have failed. In the event of an attack, the benefits of improvement to life-safety systems may be realized in lives saved.

3.4.2   The appearance of measures

The implementation of fences and barriers against terrorists is a fairly standard practice at buildings or sites that are likely targets for terrorist attacks. Protection against a determined, well-equipped terrorist group must be strong and sophisticated. The chain-link galvanized steel fence, sometimes topped with a few stands of barbed wire, is probably the most common perimeters barrier. When backed up by a guard force it is quite effective against casual and even determined intruders unless they are well equipped. A well-maintained chain-link perimeter fence is the first priority in defence against saboteurs (Federal Emergency Management Agency 2003b).

Most of the physical protection measures are fixed in place and do not allow for vehicle entry. These are to be used away from vehicle access points. The majority of these are constructed in place. For lower-risk buildings without straight-on vehicular access, these are appropriate enough. Examples of these barriers are planters, lighters, trash cans, bollards, benches, and bus shelters (see figure 3.3). Also, using landscaping features can deter an intrusion threat. An example of a simple but effective landscaping solution is to install a deep permanent planter around the building with a wall that is as high as a car or truck bumper (Federal Emergency Management Agency 2003b) .
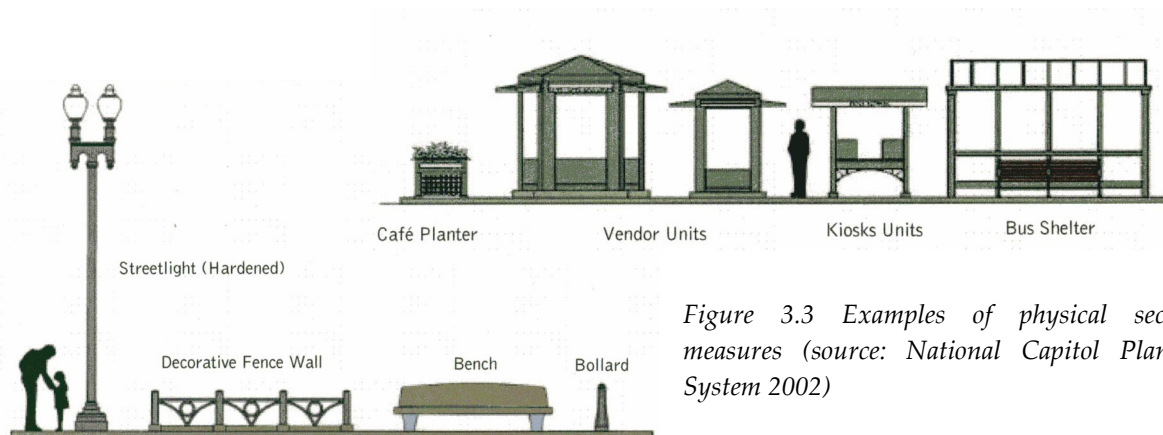
Figure 3.3 Examples of physical security measures (source: National Capitol Planning System 2002)

Individual planters placed on sidewalks resist impact through inactivity between the planter and the pavement. It can be expected that the planter will move as a result of the impact. To reduce displacement, the planter may be placed several inches below the pavement surface.

The traditional anti-ram solution entails the use of bollards. Bollards are concrete-filled steel pipes that are placed every few feet along a sidewalk to prevent vehicle intrusion. In order for them to resist the impact of a vehicle the height of the bollard above ground should be higher than the bumper of the vehicle. An alternative to a bollard is a plinth wall, which is a wall constructed of reinforced concrete with a buried foundation. The wall may be fashioned into a bench, a base for a fence, or the wall of a planter. To be effective, the height needs to be at least as high as the vehicle bumper (Federal Emergency Management Agency 2003b).

The discussed examples are largely applicable to any type of civilian building serving large numbers of people on a daily basis. The uniqueness of occupancy types from the perspective of protective design is a function of many factors, including hours of peak usage, dominant population, size of building, and construction type (Federal Emergency Management Agency 2003b). Detailed analysis of the vulnerability of important buildings or sites indicates that erection of barriers can be vital in preventing terrorists from planning or executing an attack. Obviously, barriers are of reduced value if the target routinely permits visitors to tour and note vulnerable parts of the facility.

3.5 Disadvantages of terrorist attack protection measures

In responding to the threat of terrorism, a loose network of public officials, architects, developers, engineers, lawyers, planners, security consultants, and others who influence building codes are creating a new generation of planning and design regulations, with making terrorism more difficult and reducing its human and material toll as their purpose. Unfortunately, the broader, indirect impact of these regulations, with their focus on isolating people from buildings and shutting buildings off from streets, could undermine the vitality, sense of community, and civic quality of cities (Dixon 2003). In fact, the economic, social, and design dimensions of urban communities have been largely ignored in most of the approaches to fighting terrorism that have emerged since "9/11". Many practitioners have become deeply concerned about security following the 1995 Oklahoma City bombing, and brought to the discussion a heightened commitment to enhancing security but very little focus on the impact their recommendation could have on larger issues of urban development.

The security measures discussed here threaten to provide cities with civic structures hidden behind blank, blast-resistant walls; important public buildings quarantined inside vehicle free zones; and city streets rendered more dangerous by the elimination of the windows and doorways that promote interaction between people in the buildings and on the streets (Dixon 2003).

No matter how attractively designed a 100-foot setback free of vehicles and pedestrians are, they are a serious threat to pedestrian oriented downtowns. Civic values are at stake as new regulations to fight terrorism are considered. Architects designing embassies and other federal buildings have long wrestled with the apparent contradictions between an open and free society (Kupperman & Trent 1979) and the bunker-like architectural qualities that meet security concerns.

Architects and urban planners will be challenged to create buildings and cities that do not look like bunkers or fortresses, despite their reliance on obvious security measures. This concern extends to a broad range of values that shape the civic quality of our cities. For example, creating barriers around historic buildings alters their character and diminishes a sense of connection to both historic values and traditions.

4   Methodology case studies

Case studies have been executed by doing a photographic research in three different cities in the U.S.A. and in The Netherlands. This means that by making photographs of different physical protection measures at different locations, there has been tried to portray the actual implementation of the measures and how they interfere with the building or site and the users of that building or site.

During the analysis of the cases, a methodology examines four different components for each of the photograph collages of the different case studies. The methodology exists out of the following four different components:

   1. *Protected object*

A description of the protected object will teach us the kind of building we have to deal with, the function it possesses, and/ or if it has any symbolic value.

   2. *Type and design of protection measure*

The type and design of the actual physical protection measure is important to know, because not all the protection measures have the same volume and/ or size, and that is important for the overall appearance of the implemented protection measure. Also, its design contributes for a great deal to its appearance and from that, the feeling it gives.

   3. *Is it temporary or long lasting?*

Often, one can see that some protection measures are temporary, and other ones are everlasting. To a great extent this can be recognized by the way they look and the way they are integrated in the overall design of the building or the layout of the site. There is not one determined way to ascertain if it is a temporary or everlasting measure, other than ask officers responsible for implementation or property owners, but that was not realizable. Still, it is interesting to know if it is temporary or everlasting, because the fact if it is a temporary or everlasting protection measure, could be held accountable for the time and money people have spend to implement and design it, and this could have an influence on the effect for users of affected areas. So, from the way the protection measure is designed and the way it fits in the bigger whole, is derived if it is temporary or everlasting.

   4. *Effect of protection measure for users of affected areas*

What is the influence of the physical protection measures for the users of affected areas? Does using physical protection measures to protect a building and/ or site constrain the ability to move around? Does it hinder car drivers, cyclists or pedestrians?

Symbolic value is not the same for everybody. Appearance of the protection measure and the feeling it gives is also subjective, and also the effect of the protection measure for users does not necessarily have to be the same for everybody. To get a little more objective in terms of these components, after each different case study a table with valuations of eight different analyzed variables will be given.

In one glance can be seen what the values are of the variables for each different case study. A table with the values of the variables in all the case studies can be found in the appendix (H). The different variables and the values can be seen in figure 4.1.

Variables	Values
1. Symbolic value of protected object	+ : yes
2. Economic value of protected object	0 : neutral
3. Attention for design of protection measure	- : no
4. Protection measure in harmony with surrounding	
5. Effect for pedestrians	
6. Effect for vehicles	
7. Create feelings of insecurity	
8. Effect for urban design	

Figure 4.1 Explanation of variables and values

After each case study a table will show the values for the above mentioned variables.

Also, by doing interviews or conversations with responsible officers of the municipalities, more interesting and valuable information has been acquired. These 'officials in the field' provided information which would have been difficult to know without these interviews or conversations.

5   Case studies in the U.S.A.

This chapter will analyze three different case studies in the U.S.A. Examined will be physical protection measures in Chicago, New York City and Washington D.C., by using an in advance drawn methodology. Because of logistic research restrictions, only in Chicago, IL, a more extensive and in-depth case study has been executed. Nevertheless, the information collected by executing the other two case studies provides the study with extra valuable information and will help to better draw conclusions and to give recommendations at the end of this research.

For the case of Chicago extra valuable information has been acquired by interviewing architect Mr. Albert H. Mark (City of Chicago Public Building Commission) and architect Mr. Thomas W. Vukovich (City of Chicago Department of General Services). A report of this interview can be found in appendix C. Also, a survey on the streets at a specific site in downtown Chicago has been accomplished. This survey (recorded as appendix A) has tried to collect information on a personal level from the users of that site. In New York City extra information has been acquired by having two different informal conversations with architect Mr. Richard F. Ramsey from Rogers Marvel Architects and urban planner Mr. Frank Uffen from New Amsterdam Development Consultants. There are no reports of these conversations, because they were on an informal basis. They just provided information and their ideas by either showing a presentation or showing the best sites to go to and take photographs. For the case of Washington D.C. data has been obtained by taking photographs only. Time constraints made it not feasible to speak with officials or professionals here.

Before the results of the three case studies will be shown, first some background information on terrorist protection in the U.S.A. will be given, by outlining the Department of Homeland Security and the Federal Emergency Management Agency, both responsible for terrorism prevention and protection in the U.S.A.

5.1   Homeland Security

After "9/11", the American view developed that threat assessment and risk-management should improve and grow with a full range of standing measures, in order to remove as many vulnerabilities as possible (Stevenson 2004). Responsible for this comprehensive approach is the U.S. Department of Homeland Security (DHS), which prescribes warnings at five different threat-condition levels corresponding to colours: low (green), guarded (blue), elevated (yellow), high (orange) and severe (red). Each level activates an incrementally more severe set of protection measures.

Department of Homeland Security

Vision: *"Preserving our freedoms, protecting America… we secure our homeland".*

Mission: *"We will lead the unified national effort to secure America. We will prevent and deter terrorist attacks and protect against and respond to threats and hazards to the nation. We will ensure safe and secure borders, welcome lawful immigrants and visitors, and promote the free-flow of commerce".*

Figure 5.1 Vision and mission of the DHS (source: U.S. Department of Homeland Security 2005)

The criteria for issuing the warning include the credibility of threat information; its degree of corroboration; specificity and imminence of the threat; and gravity of potential consequences (Stevenson 2004). The DHS serves to mobilize and organize the U.S.A. to secure its homeland from terrorist attacks.

One primary reason for the establishment of the DHS was to provide the unifying centre for the vast national network of organizations and institutions involved in efforts to secure the U.S.A. (U.S. Department of Homeland Security 2005). In order to do this, the department developed its own high-level strategic plan. The vision and mission statements (see figure 5.1), strategic goals and objectives provide the framework guiding the actions that make up its daily operations. In the event of a terrorist attack, natural disaster or other large-scale emergency, the DHS will assume primary responsibility for ensuring that emergency response professionals are prepared for any situation. This will entail providing a coordinated, comprehensive federal response to any large-scale crisis and mounting a fast and effective recovery effort.

More than 87.000 different governmental jurisdictions at the federal, state, and local level have homeland security responsibilities. The comprehensive national strategy seeks to develop a complementary system connecting all levels of government without duplicating effort (U.S. Department of Homeland Security 2005). Among the major components that make up the DHS is the Federal Emergency Management Agency (FEMA). It ensures that the U.S.A. is prepared for incidents, whether natural disasters or terrorist attacks, and oversees the federal government's national response and recovery strategy. It is tasked with responding to, planning for, recovering from and mitigating against disasters (U.S. Federal Emergency Management Agency 2005).

Federal Emergency Management Agency

Vision: *"A Nation Prepared"*

Goals:
1. *Reduce loss of life and property.*
2. *Minimize suffering and disruption caused by disasters.*
3. *Prepare the Nation to address the consequences of terrorism.*
4. *Serve as the Nation's portal for emergency management information and expertise.*
5. *Create a motivating and challenging environment for employees.*
6. *Make FEMA a world-class enterprise.*

Figure 5.2 Vision and goals of the FEMA (source: U.S. Federal Emergency Management Agency 2005)

In 2001, the terrorist attacks of "9/11" focused the agency on issues of national preparedness and homeland security. The agency coordinated its activities with the just formed Office of Homeland Security, and FEMA's Office of National Preparedness was given responsibility for helping to ensure that the nation's first responders were trained and equipped to deal with weapons of mass destruction (U.S. Federal Emergency Management Agency 2005). Billions of dollars of new funding were directed to FEMA to help communities face the threat of terrorism. In March 2003, FEMA joined 22 other federal agencies, programs and offices in becoming the Department of Homeland Security. The new department brought a coordinated approach to national security from emergencies and disasters, both natural and man-made. FEMA's mission remains: "*to lead America to prepare for, prevent, respond to and recover from disasters with a vision of 'A Nation Prepared'*" (see figure 5.2). Today, FEMA is one of four

major branches of DHS (U.S. Federal Emergency Management Agency 2005). By implementing physical protection measures, they try to reach their first goal, 'reduce loss of life and property.' The implementation of these measures for federal buildings (including monuments in Washington D.C.) is the responsibility from the DHS and the FEMA. Securing other, non-federal buildings is not among the tasks of the DHS or the FEMA, but is the responsibility from the property or site owner itself. The DHS or the FEMA cannot oblige private owners to implement these measure, but they do only highly recommend it.

5.2 Case study Chicago, IL

Chicago, Illinois, is the biggest and most important city in the Midwest of the U.S.A. With 2.8 million inhabitants in Chicago itself, and 8.5 million inhabitants in the metropolitan area, it is the third biggest city of the U.S.A. (Wikipedia, The Free Encyclopedia 2005). This case study comprises the financial district of Chicago, which is known as the Loop (see figure 5.3), because of the encircling by the elevated train 'The Loop'. In this area of Chicago, a lot of federal buildings, bank buildings and other offices are situated, which are, as we have learned in this study's theoretical framework, more likely to become targets of terrorist attacks, than other types of buildings. Most of them are protected against terrorist attacks by means of physical protection measures as can be seen on the following photograph collages. First, the collages will be shown, continued by the analysis according to the given methodology. For Chicago, three examples of federal buildings and/or sites, and one example of a private building will be examined.

Figure 5.3 View from the John Hancock Centre at the Loop area, downtown Chicago

5.2.1 Analysis of the photograph collages of Chicago

Figure 5.4 Federal Reserve Bank, Chicago

This first photograph collage (figure 5.4) shows the Federal Reserve Bank of Chicago. Situated on a corner of an intersection of two busy streets, it has physical protection at two sides of the building (see 5.4b and 5.4c). This bank does not have a vast national symbolic value, which makes the threat for a possible attack smaller, but still it is a bank, which represents a part of Chicago's economy.

The protection measures are big planters, interrupted by lampposts and bollards, at the front and left side of the building. Its design can be seen as stylish and is in good harmony with the classic design of the building. Altogether, the measures do not seem to be misplaced. A sidewalk, which is not accessible for vehicular traffic anyway, surrounds the building only. The protection measures do not change the traffic situation; they only hinder cars from parking too close to the building on the sidewalks. The protection measures can be taken away easily, but they seem to be pretty long lasting, since they are in such good harmony with the rest of the building and site.

The effect for the users of this building is minimal. They can reach the building by feet, they are not restricted to enter and do not have to get round the protection measures to enter the building.

The protection measures do not certainly provoke feelings of insecurity; it is not obvious that they function as terrorist attack protection measures. Only the camera on the wall (see 5.4a) can indicate that you are entering a site or approaching a building that seems to have a heightened threat of possible attacks or robberies. That can cause feelings of insecurity or can make people aware of a threat.

Figure 5.5 Court of Justice, Chicago

Figure 5.5 shows the situation at the Court of Justice. This federal building almost only has facades of glass (see 5.5b and 5.5c). The site and building are protected physically by marble quadrangles, interrupted by big elongated planters and small round ones. Again, the protection measures are in good harmony with each other and the site, so they do not attract a lot of attention. But, since they have not been put into one continuous line, and some planters have been set a little bit to the back, they can hinder people when they use the sidewalk; you have to get round them. All in all, it does not seem to be something inconvincible; there is plenty of space left to walk along the building and to use the site. These implemented measures are long lasting, but can be removed easily. Attention has been paid to the design of the measures, so they do not really provoke feelings of insecurity; they can be seen as liven up the site as well. The stylish, modern planters do not really affect the way the people enter this building or use the site. You are allowed to enter your car in the parking garage, which is patrolled by the security/ police (see 5.5d), so you can come close to the building by car as well. But, you cannot park your car around the building. Only, the little security/ police office can make you feel a little uncomfortable, and can make you enjoy the site less.

Figure 5.6 Daily Plaza, Chicago

Chicago's most used site in the city is Chicago Daily Plaza (see figure 5.6). The plaza lies in the middle of the Loop area and is the stage of Chicago's public life. During Christmas time (the time when the photographs have been taken), there is a Christmas market and the city's largest Christmas tree. It is a place where a lot of people meet each other, and is crowded most of the time. It is not of any national value, but an attack on this plaza, is an indirect attack on a lot of citizens of Chicago. The types of security that can be seen here are jersey barriers and metal fences (see 5.6a). It prevents vehicular traffic from entering the plaza and drive into the crowd. Also, there is a lot of police surveillance (see 5.6b). The protection measures seem to be pretty temporary, because they can be removed easily, and it seemed that most of them were only there at that moment because of the crowded Christmas market. This type of protection measures, fences, jersey barriers and police, show that they are, and look, temporary. They are not in harmony with the site as a whole and it looks like they are placed haphazardly. This can make people think more that they are at a place where the threat is of such a nature, that these extra security measures are needed, and from that cause feelings of insecurity.

5.2.2   Sears Tower site

Figure 5.7 The Sears Tower, Chicago

The Sears Tower (see figure 5.7) is the tallest building of America (1353 feet) and accommodates besides offices, a parking garage, a broadcast platform, a sky deck, a conference centre, a fitness facility and restaurants. Day by day, thousands of people use this site and building. People work in

this building, they come to visit, or to have lunch and use other facilities. Tourists come to see this architectural masterpiece and enjoy the panoramic view from the sky deck. Also, there are a lot of people who work in the direct surrounding of the tower and/ or use only the parking garage; they use the site as well. Because of the enormous amount of people who are attracted to and connected with the Sears Tower and its surrounding, and the symbolic value the tower has, it could be an attractive target for terrorists to attack. Attacking the Sears Tower causes a huge loss of people, information and property. That raises some questions. Do people feel unsafe when they are proximate to the Sears Tower? Do people feel unsafe on the streets in general because of possible terrorist attacks? To get to know such information, a survey among people who work in the tower, people who work and/ or live around the tower and people who come to visit the tower has been done (the actual survey has been recorded as appendix A). This difference between categories is necessary to make a distinction in the times people are proximate to the Sears Tower. But, because of restrictions to survey in the tower, it was not possible to get to know information from the category of people who work in the tower on a daily basis.

All the results have been recorded as appendix B. In total sixty people have been surveyed, thirty tourists, and thirty neighbours. The difference between gender and categories is shown in table 5.8:

Neighbours		Tourists		Total	
Male	Female	Male	Female	Male	Female
8	22	14	16	22	38
30		30		60	

Table 5.8 Respondents categorized by type and gender

The first question asked was:

1. *"How unsafe do you feel on the streets because of possible terrorist attacks?"*
The answers to this question are showed in table 5.9:

	Neighbours			Tourists			Total
	Male	Female		Male	Female		
a. very unsafe		2	2 (7%)	1	3	4 (13%)	6 (10%)
b. somewhat unsafe		11	11 (37%)	4	8	12 (40%)	23 (38%)
c. not unsafe	8	9	17 (56%)	9	5	14 (47%)	31 (52%)
	8	22		14	16		60

Table 5.9 How unsafe do you feel on the streets because of possible terrorist attacks?

52% of all of the respondents said not to feel unsafe on the streets because of possible terrorist attacks. This is more than the half of the respondents, but still there is 48% who said to feel somewhat or very unsafe, which is a remarkable high number of people. But, since we are interested in safety perceptions regarding the Sears Tower, the second question was:

2. "How unsafe do you feel when you are proximate to the Sears Tower?"

	Neighbours			Tourists				Total
	Male	Female		Male	Female			
a. very unsafe		1	1 (3%)	6	8	14 (46%)		15 (25%)
b. somewhat unsafe		13	13 (43%)	2	6	8 (27%)		21 (35%)
c. not unsafe	8	8	16 (54%)	6	2	8 (27%)		24 (40%)
	8	22		14	16			60

Table 5.10 How unsafe do you feel when you are proximate to the Sears Tower?

A fourth part said that they felt very unsafe when they were proximate to the Sears Tower (see table 5.10). Of these answers, there are more tourists than neighbours who have said to feel very unsafe or somewhat unsafe, this explains the difference in type of respondents. People who are more familiar with the neighbourhood feel less unsafe than people who are not in that neighbourhood day by day and do not know it so well. Attachment with a neighbourhood can contribute to safety feelings regarding that particular neighbourhood. People who know the Loop area and the Sears Tower very well, are more familiar with the environment, so they do not have to be more afraid of possible attacks than in any other neighbourhood or city, because nothing really bad has happened here before.

The survey continued with questions about protection measures. It is interesting to see if they have noticed them, and if it influences the way they see, use or think about the building and/ or site. The third question was:

3. "Have you noticed any protection measures at the Sears Tower since "9/11"?"

	Neighbours			Tourists				Total
	Male	Female		Male	Female			
a. no	4	1	5 (17%)	7	12	19 (63%)		24 (40%)
b. yes	4	21	25 (83%)	7	4	11 (37%)		36 (60%)
	8	22		14	16			60

Table 5.11 Have you noticed any protection measures at the Sears Tower since "9/11"?

36 out of the 60 respondents said that they did have noticed the protection measures at the Sears Tower. Only 11 out of this are tourists, so concluded can be that tourists do not know the neighbourhood from before "9/11", which sounds plausible. The 36 people who did noticed the protection measures are important for the rest of the survey, because it is interesting to know from them how they regard these protection measures. Therefore, the fourth question was:

4. *"Do you feel safer now with this protection?"*

	Neighbours			Tourists				
	Male	Female		Male	Female			Total
a. much safer		6	6 (24%)	1		1 (10%)		7 (19%)
b. somewhat safer		8	8 (32%)	2	3	5 (45%)		13 (36%)
c. not safer	4	7	11 (44%)	4	1	5 (45%)		16 (45%)
	4	21		7	4			36

Table 5.12 Do you feel safer now with this protection?

There is no big difference between neighbours and tourists in answering this question. 45% of the 36 people who did say that they have noticed the protection measures, also said that they did not make them feel safer, only 55% said that they felt somewhat or much safer. This is more than the half, but still it is not much. The protection measures have been implemented to offer a heightened security level and to let all the people feel safe. Still, there is a big number who does not feel safer with this protection. Is it due to the way the protection measures look? Do the protection measures itself provoke feelings of insecurity? Do they strengthen their feelings of insecurity, because without the security measures they would not have realized that they are approaching a site or entering a building with a heightened threat for terrorist attacks? Or do they, because of the implementation, hinder them in the way they use the building and/ or site? To get to know more detailed information, the survey continued with:

5. *"Do any of the changes at Sears Tower constrain your ability to move around?"*

	Neighbours			Tourists				
	Male	Female		Male	Female			Total
a. yes	2	7	9 (36%)	2	3	5 (45%)		14 (39%)
b. no	2	14	16 (64%)	5	1	6 (55%)		22 (61%)
	4	21		7	4			36

Table 5.13 Do any of the changes at Sears Tower constrain your ability to move around?

The protection measures at Sears Tower do not really constrain their ability to move around, according to 61% of the respondents who did say that they have noticed the protection measures. They use and enjoy the building and/ or site in the same way as they did without the protection measures. Remarkable is that relatively more tourists than neighbours indicated that the protection measures hindered them in the way they use or enjoy the site. But, this can be explained by the fact that the entrance to the sky deck (tourist attraction) and the sky deck itself is a lot more protected than other parts of the building by means of technical security, surveillance and cameras.
All in all can be questioned:

6. *"Do you regard this kind of protection as positive or negative?"*

	Neighbours			Tourists				Total
	Male	Female		Male	Female			
a. positive	3	16	19 (76%)	6	3	9 (82%)		28 (78%)
b. negative	1	5	6 (24%)	1	1	2 (18%)		8 (22%)
	4	21		7	4			36

Table 5.14 Do you regard this kind of protection as positive or negative?

Apart from feeling safer or not, or feeling constrained to move around, 78% said that they regarded this kind of protection as positive. It can be true that people, due to personal reasons, do not really feel safer with this protection, and/ or that they feel constrained to use or enjoy the building and/ or site, but, most of them do regard it as a positive measure to protect against terrorist attack, regardless of type or gender of the respondent.

5.2.3 Conclusion

After having seen the photographs and having done the survey, the conclusion can be drawn that all of the seen protection measures in Chicago are not of such an order that they provoke feelings of insecurity. They all are in good harmony with the site and/ or building they are meant to protect, and they do have a proper design. According to the responsible officers, architects Albert H. Mark and Thomas W. Vukovich (2004), it is important to make it look pleasant: *"you have to find a balance between making people feel welcome and not making it a fortress"*. That is why they want them to function well and do not want them to constrain citizens to move around a site or building. The survey taught us that 78% of the people, who did say earlier that they have noticed the protection measures, regard the measures as positive. *"They understand the necessity of the situation. It is a mind-set they have established; the need to feel safe"(Mark and Vukovich 2004).* Only 39% said that they felt constrained in moving around the site.

The physical security measures seem to be in good harmony with the affected buildings in Chicago. Chicago would not so quickly become a fortress, according to Mark and Vukovich (2004). *"But, you have to take aesthetics into account when anti-terrorism measures are being implemented. An architect has to stress the importance of the form as well as the function"*.

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of Chicago:

	Symbolic value	Economic value	Design of pro-tection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 5.4	+	+	+	+	-	-	0	+
Figure 5.5	+	-	+	+	+	-	0	+
Figure 5.6	+	-	-	-	-	+	+	+
Figure 5.7	+	+	+	+	-	-	0	0

Table 5.15 Valuation table variables case studies Chicago, IL

5.3 Case study New York City

New York City is, with its 7,3 million inhabitants, the biggest city in the U.S.A. The case study here covers Manhattan, a large area filled with other smaller neighbourhoods. Manhattan is the main financial and business district of New York and has the most shops and tourist attractions of the city. Also, it is the area were the world famous attacks of "9/11" took place. This site, formerly known as

the World Trade Centre site, is now known as 'ground zero' and still gets rebuild at the moment (see figure 5.16). Most of the protected buildings in Manhattan are in the financial district called Wall Street, and a smaller business district along the Hudson River called Battery Park. Also, some other bank buildings at other places in the city and the broadcast building of the CNN are protected by physical protection measures, and to a lesser extent federal buildings as well.

Figure 5.16 Ground zero, New York City

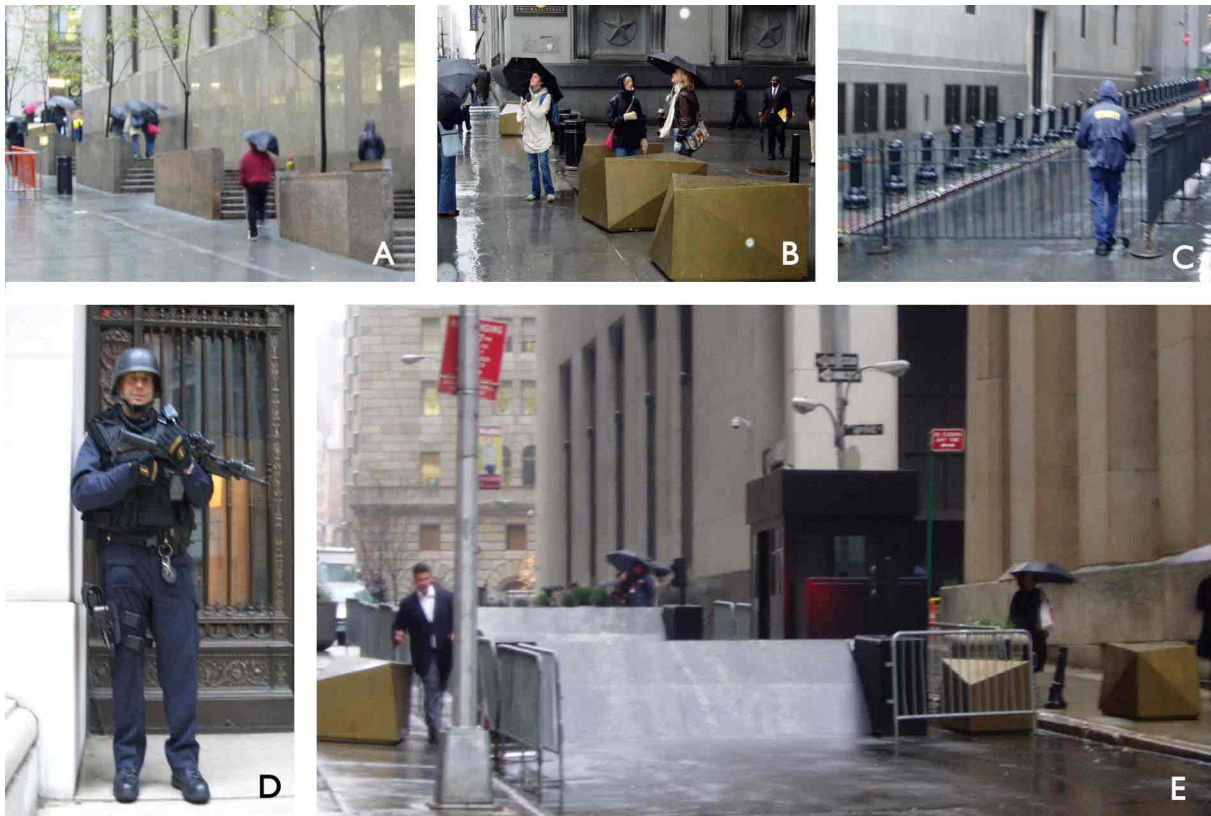### 5.3.1 Analysis of the photograph collages of New York City

Figure 5.17 Wall Street, New York City

The protected object as shown on figure 5.17 is a whole area, called Wall Street. Including the New York Stock Exchange, it is the heart of the economy of the U.S.A. Besides the economic value it has, it also has a major symbolic value. Attacking any building on Wall Street can be seen as a direct attack on capitalism, for which the U.S.A. is known. The type and design of the protection measures here are of a serious kind (see 5.17c, d and e) and are not meant to look nice, stylish and friendly at all. At least they have placed black coloured fences (see 4.18c), instead of just metal coloured ones. At only one of the entrances of Wall Street they have placed futuristic cubistic objects on which people can sit as well (see figure 5.17b). But, it is still obvious that they function as a safety measure, and they are not in harmony with their surrounding. Also, at one building they have integrated the security measures into the overall design of the building, and with the same materials (see 5.17a). You cannot really tell that they are placed there because of security reasons, but they do prevent cars from coming too close to the building.

Some of the measures, 5.17c, d and e, are obvious temporary, and it looks like they are not there all the time (which is true for 5.17d), and can be removed easily if a vehicle wants to enter the zone with permission. Measures like 5.17a are everlasting, and like 5.17b are long lasting. They are implemented permanently to make the environment safer. It looks like, the implementers have spend more time and money on the design of these measures, which is accountable for the way they look.

The effects of the measures on and around Wall Street are twofold. On the one hand, they look very aggressive and do the measures itself, by just being implemented, create a feeling of insecurity. They look cheap and temporary and do not influence the users of this area positively. On the other hand, they have tried to make some measures look nice and because of that they do not really emit a feeling of insecurity. Some are even user-friendly and can be sit on. These do not really affect the safety feelings of users of this area. The only thing that can be said about all of these measures, is that they prohibit vehicular traffic to enter the area, without permission. In this way they influence the way people used to use this area.

Battery Park, a small business district along the Hudson River is shown on figure 5.18. This area consists of a lot of office buildings, and to a lesser extent bank buildings also. The protected objects here are these buildings and also, the boulevard along the nearby marina. The type and design of the protection measure we see here can simply be qualified as non-artistically. A little police patrol office, huge metal fence-like measures with red coloured stop signs (see 5.18b and c) dominate the streetscapes here. At another intersection, just laying down rocks has closed the road, which prevents entering from vehicular traffic (see 5.18a). Despite the accompany of better looking bollards, the measures make you aware of the present threat of a terrorist attack. They create a 'no go' zone and most of the area cannot be reached by car. Maybe because the threat for this area is not a permanent
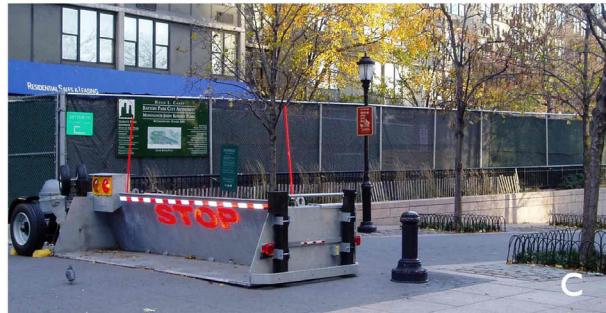
Figure 5.18 Battery Park, New York City

one, these kinds of measures have been implemented here. If the threat is getting less the measures can be removed really quickly, and the original user-friendly situation can be restored.

Again, the effect for the users of this area is that they cannot reach this area close by car. They can walk around the area freely, but because of these worse, aggressive looking measures they can feel more insecure than without these measures.

Figure 5.19 Broadway, New York City

The photographs on figure 5.19 have been taken on Broadway, New York City. 5.19a and b show a situation at a corner where a bank building is situated.

The planters have been installed just to prevent for possible attacks or, in case of an accident, for cars to drive into its front façade. Although they can be removed pretty easily, they are long lasting, because the risk of a traffic accident on this busy intersection is always present.

They do really affect the way citizens use the sideways. Streams of passers-by get deregulated when they want to enter the sidewalks after the crossing, as can be seen on 5.19a. Both protection measures do not really provoke feelings of insecurity, to a certain degree they look nice and friendly.
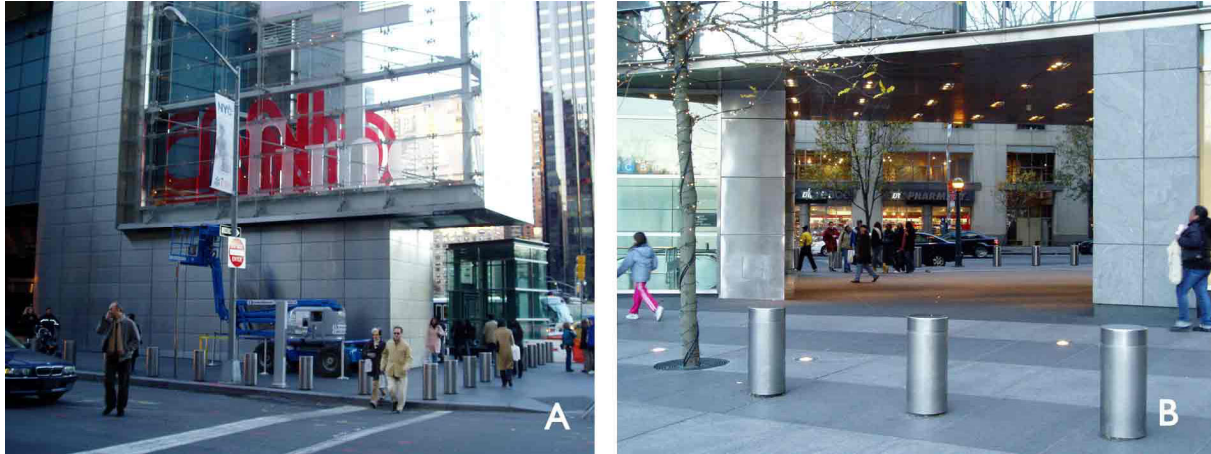
Figure 5.20 CNN broadcast building, New York City

At the end of Broadway, the broadcast building of CNN is settled (see figure 5.20). CNN is the number one national television station, and therefore has a lot of national symbolic value. The protection measures are stylish bollards, in harmony with the design of the building. They have been implemented everlasting, not only because of possible attacks, but also because the building is situated at a roundabout and is an easy target for cars to hit in the case of an accident. That is also the reason why these anti-ram bollards have been implemented. The effect of the measures at the CNN building is very minimal. You cannot park your car at that site anyway, and it is prohibited to park at the sideways as well. Also, they do not constrain any ones ability to move around the site, since they are not of such a size that you have to get round them.

5.3.2   Conclusion

The case study in New York City has shown that terrorist attack protection measures appear in a lot of different types and designs. Also, the spheres they emit differ, just like the effects they have for citizens in terms of constraining their ability to move around the site freely. The examples of Wall Street can be marked as 'worst case scenario'. They do not look 'friendly', and contrast with the environment they stand in. The measures are too obvious protection measures and therefore they may provoke feelings of insecurity. Maybe, if only more time and money was spend on designing this area, in terms of protection, they could have been in more harmony with the environment.

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of New York City:

	Symbolic value	Economic value	Design of pro-tection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 5.17	+	+	0	0	+	+	+	+
Figure 5.18	-	+	-	-	-	+	+	+
Figure 5.19	-	+	+	+	+	-	-	+
Figure 5.20	+	-	+	+	-	-	-	0

Table 5.21 Valuation table variables case studies New York City

5.4   Case study Washington D.C.

Washington, District of Columbia, is the nation's Capital City, also known as the Federal City. In this administrative district of the U.S.A., the centres of all three branches of the U.S. federal government, as well as the headquarters of most federal agencies are located. Washington also serves as the

headquarters for the World Bank, the International Monetary Fund, and the Organization of American States, among other international (and national) institutions. Because of this, often massive political demonstrations and protests take place, particularly on the National Mall, the site of numerous national landmarks, monuments and museums (see figure 5.22). The Mall stretches from the Lincoln Memorial on the western border to the Capitol on the east. The Mall is surrounded by world known museums, memorials and other monuments, which makes it a very popular tourist attraction in the U.S.A. This case study examines examples of terrorist attack protection measures at buildings on and around this National Mall.

Figure 5.22 The National Mall in Washington D.C. (source: Wikipedia; The Free Encyclopedia 2004)

5.4.1   Analysis of the photograph collages of Washington D.C.

Figure 5.23 Downtown Washington D.C. (source: National Capital Planning System 2002)

The photographs of figure 5.23 are taken by the National Capital Planning System for 'The National Capital Urban Design and Security Plan'. This plan designs protection measures for Washington D.C., by either implement them in existing conditions, or design and develop complete new situations. On 5.23c, 'The Washington Monument', which honours the first president of the U.S.A., is protected by jersey barriers, which prevent cars from coming too close to the monument. These jersey barriers are temporary and are being removed as soon as the new, integrated security measures are ready.

On 5.23f we see existing conditions at the White House. The whole area around the White House is secured by using a large black fence, which separates the site from the sidewalk, and the sidewalk is separated from the streets by using bollards, which makes it a double anti-ram protection. As long as the president of the U.S.A. will live in the White House, these protection measures are there to stay. Figures 5.23a, b, d and e show different situations in Washington D.C. that are protected by either jersey barriers, or planters. Again, these jersey barriers are designed and developed to stay temporary, so they are not incorporated into existing situations and that can make them look unstylish and unfriendly.

The effects of the shown measures here in terms of feelings of insecurity are quite large. Most of them are not integrated into the overall urban design and look like they are placed haphazardly. Only at the White House the protection measures are in harmony with their surrounding and are of a proper design. In terms of constraining the ability to move around, they do have effects for users of the area they are placed in. The jersey barriers are measures that regulate traffic and prohibit cars to go into streets and close off some streets completely as well.

Figure 5.24 Federal triangle, Washington D.C.

The photographs of figure 5.24 a and b are made in the Federal Triangle in Washington. It contains a number of federal offices and government buildings. These planters have a classic design and they fit with the appearance and design of the buildings in their surrounding. They are placed long lasting, but as soon as the threat for attacks is diminished, they can be removed easily and the openness of the

area can be restored. It can be accepted that the effect for the users of this area is zero, because they look nice and do not provoke feelings of insecurity, but that is a subjective judgement, and can differ from person to person. They sure do not constrain any ones ability to move around the area, because you are not allowed to enter by car anyway. Also, you do not have to get round the planters to come close to the buildings.

The example of 5.24c is of a totally different kind. Protected here is the area around the Library of Congress, the world its largest library. The type of protection measure we see here is very aggressive and prevents you from using a street, which you probably could use in the past. Also, the bollards are placed closed to each other, which makes the sidewalks less accessible. The bollards seem to be pretty long lasting, and the measure in the middle of the road can be made active by putting up the fence in such a way that the stop signs are visible. The effects for users of this site are pretty high. Due to their appearance they can easily cause feelings of insecurity, and also they really constrain you to move around the area freely.

5.4.2 Conclusion

Washington D.C. is the nation its capital city and has the most federal and governmental offices, as well as monuments and memorials, of the country. All this, makes that this city has a large symbolic national value, despite the fact that is does not have a lot of business or financial areas.

The protection measures at stake here are therefore most of the time of a serious kind. Because Washington D.C. is seen as the city of all the Americans, an attack on any building with a symbolic function in Washington D.C. touches the lives of millions of Americans.

After the "9/11" the number of protection measures implemented has increased, which is the reason that so many temporary jersey barriers dominate the streetscapes. And, because of these barriers, in Washington D.C. most of the protection measures can constrain your ability to move around. But, in the nearby future, this will be less, because of the National Urban Design and Security Plan. They create new measures, which are more integrated into the overall design and therefore look less obvious, and they improve existing conditions.

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of Washington D.C.:

	Symbolic value	Economic value	Design of protection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 5.23a, b	-	-	-	-	-	+	0	+
Figure 5.23c	+	-	-	-	-	-	+	+
Figure 5.23d	-	-	+	+	+	-	-	0
Figure 5.23e	+	-	-	-	-	+	+	+
Figure 5.23f	+	-	+	+	-	-	0	0
Figure 5.24a, b	+	-	+	+	-	-	-	0
Figure 5.24c	+	-	-	-	+	+	+	+

Table 5.25 Valuation table variables case studies Washington D.C.

5.5 Conclusion case studies in the U.S.A.

After having done the three case studies, one thing is remarkable: the difference in the design of the protection measures between the three cities. At first, it has to be said that there is a difference in the design of the measures between the facts if it is a city owned facility or a private owned. In case of protection measures at private owned buildings (Sears Tower, CNN building), they seem to be incorporated more into the overall design of the building and the site.

Secondly, even between city owned facilities in the three cities there is a difference. In Chicago, it looks like more time and money is spend on a proper layout and design of the protection measures. To explain this, one can say that the threat for a terrorist attack is not as high as in the two other cities, who both have been the scene for terrorist attacks on "9/11". Because of that, in New York City and in Washington D.C. protection measures have been implemented rapidly and haphazardly. So, it seems that time, money and threat level can be held accountable for terrorist attack protection measures to look nice and to be in good harmony with the building they protect. That can be concluded if you look at the difference between the cities.

Thirdly, if you look at the protection measures itself, it can be concluded that the effects they have for users of specific buildings and/ or sites differ in the type and design of the measures. This is also a result of the site they are implemented in, what means the difference between the way people used to use the site and the way they can or have to use it now because of the implementation of the measures. Nice looking planters, or small bollards of a proper stylish material do not necessarily have to look like they are protection measures. Some are even user-friendly and can be sit on. Some of the measures as we have seen on Wall Street in New York City and near some monuments in Washington D.C., look aggressive and they can easily provoke feelings of insecurity. But, that judgement is not objective, and can differ from person to person.

6 Case studies in The Netherlands

The following chapter will analyze three case studies in The Netherlands. These case studies have been done in the three biggest cities based on inhabitants; Amsterdam, Rotterdam and The Hague. Amsterdam is the capital city of The Netherlands, Rotterdam is an important industrial city because of its international known harbour and The Hague is the political and royal capital.

The case studies will be analyzed using the same systematic as in the preliminary chapter. The different photograph collages will be analyzed using the same methodology (description of protected object, type and design of protection measure, categorize the protection measure as temporary or long lasting, and the effect of the protection measure for the users of affected areas). Also, after each case study a table with a valuation of eight different analyzed variables will be given.

Interviews with responsible officers of the three different municipalities have been held. By executing this interviews, Mr. H. v.d. Vet (The Hague), Mr. D. Berg (Rotterdam) and Mr. M. Schilstra (Amsterdam) provided information on terrorist attack protection in their municipalities. Quotes of these interviews are interweaved throughout the text. The complete notes of these interviews can be found in the appendices (D, E and F). Also, an informal conversation has been held with Mr. H. Croes and Mr. R. Geerligs of the Government Buildings Agency.

Before the results of the case studies in The Netherlands will be given, some background information on terrorist protection and prevention in The Netherlands will be given. Outlining the goals and tasks of the General Intelligence and Security Service (GISS) will do this.

6.1 General Intelligence and Security Service

The Dutch government has worked hard since "9/11" on better protecting against terrorist attacks in The Netherlands. They invested in the capacity of the General Intelligence and Security Service, in The Netherlands known as the *Algemene Inlichtingen- en Veiligheidsdienst*, and also the exchange of information has been improved. This is shown by the '*Action Plan on the Fight against Terrorism and Security'* (Rijksvoorlichtingsdienst 2004). It contains a package of measures with which the government wishes to step up the fight against terrorism. It concerns both the reinforcement of existing policy and new accents and priorities and focuses on prevention of terrorist attacks and to prosecute terrorists. In order to deal effectively with the protection and security of vulnerable persons and objects the intelligence and security services are provided with extra resources.

The GISS will take measures to counteract acute situations of threat. In the event of a threat, various authorities and organizations will be called according to the existing lines of authority, to monitor and secure people and institutions in The Netherlands. This can involve evacuations, roadblocks, halting train and air traffic or stopping telephone communication in a certain region (Rijksvoorlichtingsdienst 2004). Also, the GISS advances the security of the government and parts of the economic life. They advise about crucial security efforts. The physical security task is just a little part of that.

An early warning system will inform agencies, companies and citizens about any increased risk for terrorist attacks. The GISS recognizes an important development in the current threat of terrorism.

It does not only focus on vital goals anymore, but it can also strive for as much victims as possible. Potential goals are defined as *soft targets*, and will be drawn up in a list (Algemene Inlichtingen- en Veiligheidsdienst 2005). These are places where a lot of people come together without much security, like railway stations and restaurants and bars. The government will identify these *soft targets* as well as any steps to be taken in a situation of threat. This includes potential targets that may form an increased risk due to the nature of the target. Extra capacity will be created to increase tracing, monitoring and disrupting individuals who are internationally considered to be potential terrorists.

The cooperation across the entire area of combating terrorism is raised to a structurally higher level. On the national level, there is cooperation between the General Intelligence and Security Service, National Police Agency, Immigration and Naturalisation Service, and the Public Prosecution Service. This is called the CT-Infobox (contra-terrorism information box) (Algemene Inlichtingen- en Veiligheidsdienst 2005). The CT-Infobox is researching the threats and risks concerning these people, institutions and their property. They also criticize the current level of security. Combining all of the available resources will greatly enhance the effectiveness of the government. Information will be gathered, analysed and used more efficiently, sufficient instruments will be available to ensure timely action and prospective targets will be protected adequately. What they do is monitoring and surveying of people, institutions and their buildings on a continuous level, to make a threat assessment. All efforts will be combined under the authority of the National Anti-Terrorism Coordinator (Ministerie van Justitie 2005). The coordinator will be responsible for policy development, analysis of (intelligence) information and directing security measures in combating terrorism. This is intended to facilitate a realistic threat analysis at any given time. The coordinator will also be responsible for directing security, i.e. identifying (vital) targets, developing and implementing an early warning system, and monitoring implemented measures.

The Netherlands will have to continue to monitor significant acts of terrorism for the foreseeable future. The government's ability to tackle the terrorist threat effectively will be determined by: obtaining and using information efficiently; the resources and powers provided to enable a timely response; adequate surveillance and security of prospective targets; a cross-border approach and limiting the breeding ground for recruiting potential perpetrators (Ministerie van Justitie 2005).

6.2   Case study The Hague

With almost 470.000 inhabitants (Gemeente Den Haag 2005), The Hague is the 3rd largest city in The Netherlands. Being the court capital (the government and the royal residence), it has an important function for The Netherlands. It accommodates different royal palaces, the nation's most important governmental buildings, and some foreign embassies and consulates. Also, the International Court of Justice is accommodated in The Hague. Besides the photographs collages, this case study will be discussed by using an interview with Mr. H. v.d. Vet, responsible officer of the Department of Public Order and Safety of the municipality of The Hague.
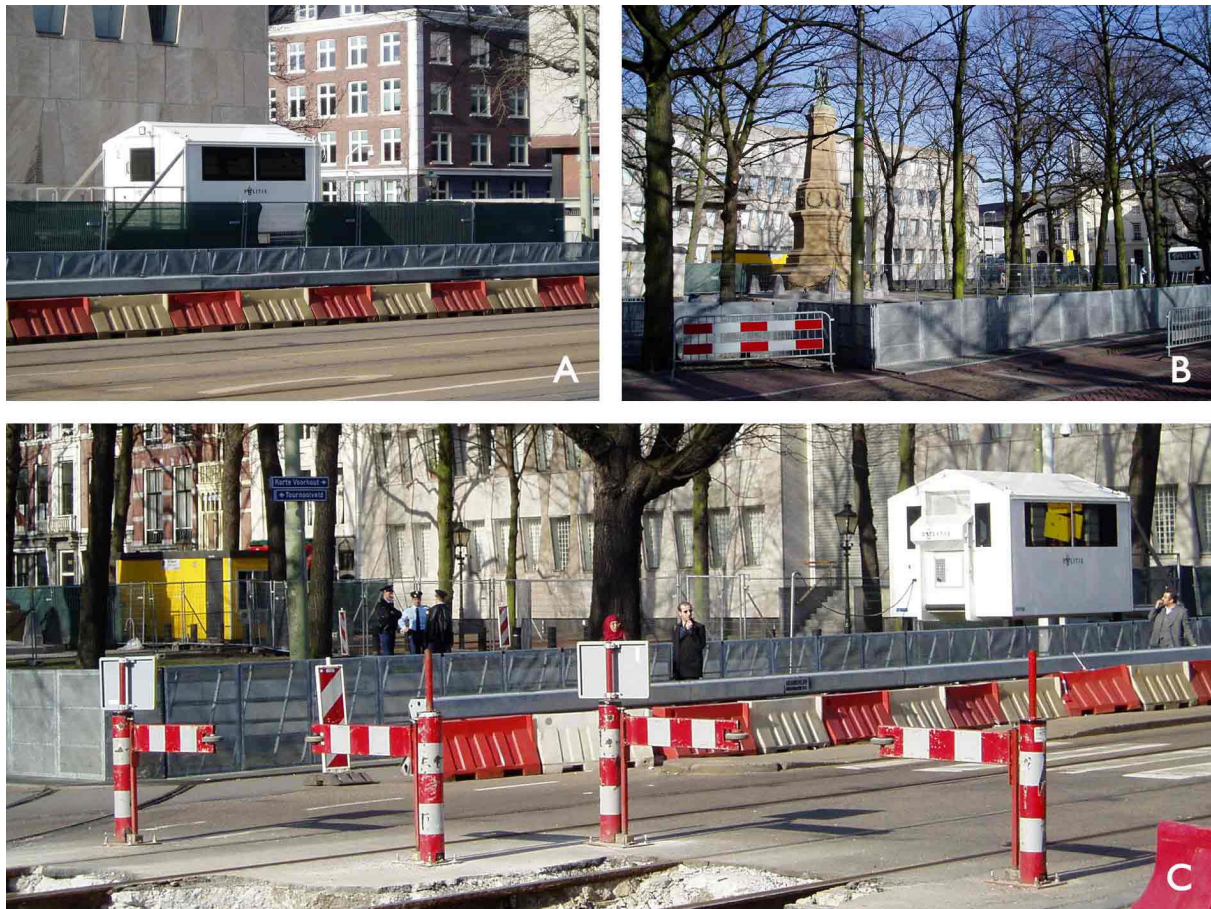
Figure 6.1 U.S. embassy, The Hague

The first photograph collage (figure 6.1) shows the U.S. embassy at the 'Korte Voorhout' in The Hague. Because it is regarded as a part of the U.S.A. in The Netherlands, this building is seen as one of the most threatened ones in The Netherlands. For terrorists, it could be a good target on U.S. property on Dutch soil. That may be the reason for having so much physical protection; it has three different zones of protection. The exterior zone consists of red and white-chained roadblocks, the middle zone has one-meter high metal fences, and the inner zone is filled with policemen and/or guards. Also, a white police unit is housed in this zone for extra surveillance. Design wise, the implemented security measures seem not to be in harmony with their surrounding. The type of material is not the same as the protected object and that is the reason why the measures are so obvious. The implemented security measures are of a temporary kind and can be removed easily. As soon as the embassy moves, and the building gets another, less threatening, function, the protection measures will be taken away, and the site layout can be restored.

These measures have a large effect for the users of the site. The pavement and the cycle path have been removed and replaced together in one lane, separated from each other by a metal framework. This influences the space pedestrians and cyclists have to walk or cycle. Also, a large part of what used to be public space (pavement, slopes or lawn) has been incorporated for implementing the different zones of security.

Altogether, the implemented physical protection measures are fortress-like and can make you the enjoy the site less, because they send out a feeling of aggressiveness and unfriendliness.

Figure 6.2 Ministry of Foreign Affairs, The Hague

In figure 6.2 the Ministry of Foreign Affairs has been examined. This governmental building has a certain symbolic function as representing the foreign contacts The Netherlands has. The protection measures we see here are long lasting (6.2a), as well as temporary (6.2b). The long lasting measures are incorporated into the existing situation by using the same high quality materials as the building itself is made of. They have heightened the pavement to such a level that vehicles cannot ride onto this and the cycle path is fenced off by using a bollard; this also impedes vehicles from riding onto the cycle path or pavement. The temporary red and white roadblocks also fence off the building from the road and cycle path; but they can be removed easily when the risk of a terrorist attack is diminished. The effect for users is very minimal here, because the pavement and cycle path can still be used to the same extent. But, the temporary roadblocks just show that you are entering a site with a high threat or risk of an attack or any other inconvenient situation.

The third photograph collage (figure 6.3) shows five different situations of physical protection measures in downtown The Hague. 6.3a shows the entrance of the 'Binnenhof' (the centre of government). Here, the office of the prime minister and parliament is situated. Implemented bollards and flower boxes, supplied with police surveillance, fence off the entrance. The protection measures are long lasting and in harmony with the surrounding, except for the policemen and car. The bollards can sink into the ground, to let cars enter the site after a thorough inspection by the police. The effect for users here is minimal. It has never been publicly accessible by car; only by appointment. So, these measures do not incorporate public space. You still can enter the site by foot without going through security. And, the measures are relatively subtle, so they do not really influence the appearance of the 'Binnenhof'. Figures 6.3b and c are examples of respectively the Organization for the Prohibition of Chemical Weapons and (a part of) the International Tribunal for the former Yugoslavia; who both have a certain symbolic value and for this reason are buildings/organizations at high risk. In the example of 6.3b, the security measures have been implemented properly and fit into the layout of the site and with the appearance of the building.

Except for the entrance for the parking garage, the building is not accessible by car (which it had never been before), because you cannot park your car around the building, so the effect for users is very minimal here as well. It still is accessible for pedestrians, and there is a pavement and cycle path in front of the building. Since the protection measures are incorporated during the building of the building, they are long lasting, and cannot be replaced easily. 6.3c attracts people's attention, because of the police car and the little office; this makes people more aware of a threat.

Figure 6.3 Five different security situations in downtown The Hague

Figure 6.3d shows the example of Intrum Justitia; a provider of credit management services. This organization is a justice building on a corporate or personal level. It does not have a symbolic (Dutch) value, nor any national economic value, but still it can have a value reaching into a personal sphere, because it tries to solve 'conflicts' between two parties. The protection measures implemented here a of a long lasting kind, and are incorporated into the building's design by implementing flower boxes which impede cars from driving into the façade. They do not have any influence on any user of the building or site.

The Ministry of Housing, Spatial Planning and the Environment is shown in figure 6.3e. This Dutch governmental building does not have an economic or symbolic value directly. Only protecting the backside of the building, these flower boxes fit well into the layout and design of the site and building. The flower boxes can be removed easily, but that would give the building a higher risk of cars coming

too close to the building. There is not any effect for users of this site and building. It is still publicly accessible by feet, and you are not allowed to park your car around the building anyway.

6.2.2 Conclusion

This case study has shown that The Hague has a certain risk for terrorist attacks, because it is the court capital of The Netherlands, an for that reason has many governmental buildings, but also because of the international organization who are housed here. Especially the U.S. embassy is of great influence for the inhabitants of The Hague. According to Mr. H. v.d. Vet (2005), responsible officer of the Department of Public Order and Safety, the municipality would like to see the U.S. embassy moving out of the inner city, because in their opinion it brings a unacceptable threat for a terrorist attack. The photographs have shown that the protection measures are placed haphazardly, and that they have incorporated a large part of what used to be public space. Also, the pavement and the cycle path have been replaced, so the effect for the users of this site can be qualified as pretty high.

The Hague also has examples where the protection measures have been implemented very properly into the existing situation of the site or the design of the building. The example of 6.3b, d and e taught us this. In most of the cases the measures have been implemented right during the building of the object, and in other examples the security measures are flower boxes, which are regarded as livening up the site and/ or building. *'The difference lies within the design of the site around the protected object'*, according to Van de Vet (2005), *'in The Hague we try as much a we can to take the existing situation into account… but the site layout is decisive whether you can solve it on a naturally way, or if do not have enough space to do this'*.

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of The Hague:

	Symbolic value	Economic value	Design of protection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 6.1	+	-	-	-	+	+	+	+
Figure 6.2	+	0	0	0	+	0	+	+
Figure 6.3a	+	-	+	+	-	+	0	+
Figure 6.3b	+	-	+	+	-	-	-	0
Figure 6.3c	+	-	-	-	-	-	+	+
Figure 6.3d	+	0	+	+	-	-	-	-
Figure 6.3e	+	0	+	+	-	-	-	0

Table 6.4 Valuation table variables case studies The Hague

6.3   Case study Rotterdam

Rotterdam, the second largest city has approximately 600.000 inhabitants (Gemeente Rotterdam 2005). Rotterdam is worldwide known for its harbour, which is the largest of the world. Its population is highly multicultural; it consists of almost 60% of different ethnical groups.

This case study examines a Jewish synagogue in a neighbourhood called 'Hilligersberg', a jeweller at the 'Schieweg' and a bank building just outside the main shopping area in the inner city of Rotterdam. Besides the photograph collages, this case study will be discussed by using an interview with Mr. D. Berg, responsible officer of the Department of Public Order and Safety of the municipality of Rotterdam.

6.3.1   Analysis of the photograph collages of Rotterdam

Figure 6.5 Jewish synagogue, Rotterdam

At figure 6.5 we see a Jewish synagogue in the neighbourhood called 'Hilligersberg', just outside downtown Rotterdam. This synagogue has a lot of symbolic (religious) value and has had physical protection for many years already. After the murder of Van Gogh last November and the commotion it gave afterwards, the Jewish community asked for better protection. The synagogue used to be protected by bollards at the front and on one side of the building (6.5a and b), but last winter it also got bollards at the back and at the other side of the building (see figure 6.5c and d). Those bollards are

in the same colour as the pavement and the colour of the building, so they are in good harmony with their surrounding. They are digged into the ground, which means that they have been implemented to last long, but if the threat is diminishing they can be removed and the site can be restored. There are no side effects for the users of this site and building. You are not allowed to park your car on the pavement or lawn anyway, so the bollards do not impede anyone. There is enough space left for pedestrians to use the pavement. Also, the bollards do not look aggressive; they do not really send out a feeling of insecurity.

Figure 6.6 Jeweller, Rotterdam

A jeweller at the 'Schieweg' in Rotterdam who has implemented anti-ram bollards can be seen at figure 6.6. This building has a large economical value and is a vulnerable object for robberies. Coloured stylish and skilful anti-ram bollards, to protect its front façade against cars driving into this building, protect the building. This is protection against criminals and robberies more, than protection against real terrorist attacks, but it is interesting to see how those anti-ram bollards can also be implemented in a colourful statue-like manner. They are implemented to last as long as the jeweller is housed in this building. The effect for users here is very minimal. Yes, you have to get round them, because they stand in the middle of the pavement, but it is restricted to ride here with your bicycle or car anyway. And, accepted can be that they influence the site positively, because they are implemented as being art objects, and that is how they look also.

What can be seen at figure 6.7 is a bank building right outside the main shopping area in downtown Rotterdam. This bank building has economical value and is protected by one layer of security, at the perimeter line. Bollards have been implemented, attached to each other with metal chains, to prevent cars from coming too close to the building in case of a robbery or to deliver a bomb. As long lasting measures, they are in good harmony with the building and site itself and do not really look like as being physical security measures. They do not have any influence on the user its behaviour; the streets are still completely accessible for cars and bicycles, and pedestrians can still use the site and enter the building the way they want to. You are just not allowed to park your car at the site, but that has not been changed after the implementations, because the implementations have been done during the building of the building itself already.
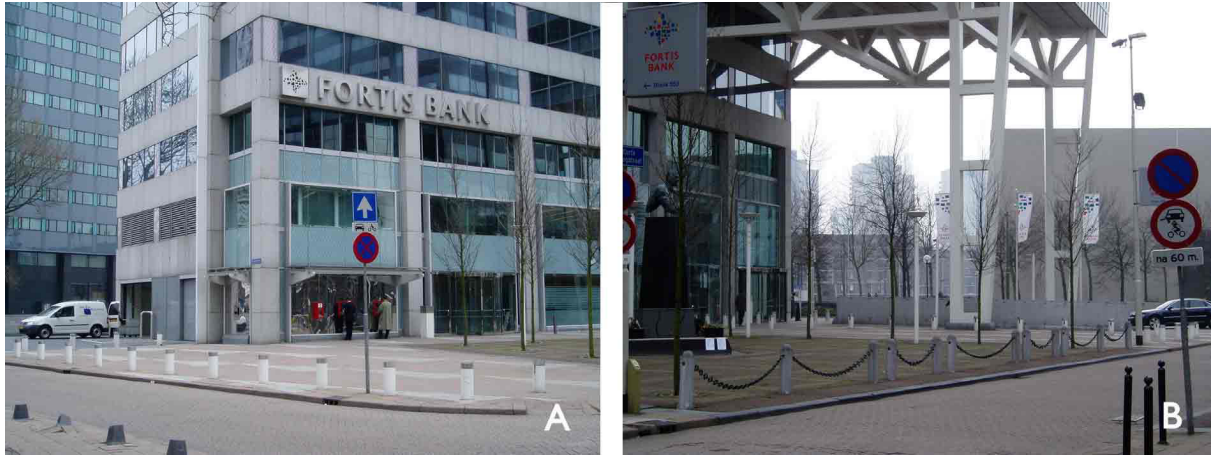
Figure 6.7 Fortis Bank, Rotterdam

6.3.2   Conclusion

Rotterdam has shown us that also religious objects are at risk of terrorist attacks. *'A Jewish synagogue has asked for more physical protection measures after the murder of Van Gogh last November'*, said Mr. D. Berg (2005). *'It had protection at the front and at one side, but not at the backside of the building… and now the bollards are already implemented'*.

The jeweller at the 'Schieweg' shows another, remarkable, example of physical protection. Here, the jeweller did implement anti-ram bollards to prevent cars from driving into its façade in case of an accident or robbery. This is not really an example of anti-terrorism protection measures, but an example of how artistic these measures also can be designed; the bollards are painted as being a man and woman standing in front of the shop. This shows that the measures do not always have to be one-coloured, or of the same size. Much is possible to make the measures look like they are not really anti-terrorism measures, but art objects.

In Rotterdam, we have not seen, the 'serious' kind of physical protection measures, as we have seen already in New York City or in The Hague. That is because of the functions of the protected objects here. They do not really possess any national value, only the synagogue has some symbolic (religious) value.

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of Rotterdam:

	Symbolic value	Economic value	Design of pro-tection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 6.5	+	-	+	+	+	-	0	+
Figure 6.6	-	+	+	0	+	-	-	0
Figure 6.7	-	+	+	+	-	-	-	-

Table 6.8 Valuation table variables case studies Rotterdam

6.4 Case study Amsterdam

The nations capital city (and largest city) has approximately 740.000 inhabitants (Gemeente Amsterdam 2005). Only being the capital city can already make Amsterdam a city with a relatively high terrorist threat. The question if this presumption is true, shall be tried to answer by examining different locations and interviewing Mr. M. Schilstra, responsible officer from the Department of Public Order and Safety of the municipality of Amsterdam.

6.4.1 Analysis of the photograph collages of Amsterdam

Figure 6.9 The Nederlandsche Bank, Amsterdam

At figure 6.9 we see the Nederlandsche Bank in Amsterdam. It has great economical and symbolic value; economical because of being a bank and representing economic life in The Netherlands, and symbolic because of being Dutch and state owned. An attack on the Nederlandsche Bank can be seen as an attack on The Netherlands itself, but also on the Dutch economy. The protection measures being in place here are of a naturally kind: flower boxes. They last as long as the Dutch Bank is housed in this building and the measures are in good harmony with the site and the building. They interfere pretty well with their surrounding. The protection measures have no influence on the users of this site and building. They do not really look like as being protection measures. The only influence they can have is positively, as being beautiful in bringing more green onto the site. They do not restrict cyclist or pedestrians to use the site freely, and they only restrict cars from approaching the building too close.

Figure 6.10 U.S. consulate, Amsterdam

The highly threatened U.S. consulate at the 'Museum Square' in Amsterdam can be seen at figure 6.10. Being one of the two best-protected objects in The Netherlands, this building has a far-reaching symbolic value. Four levels of security protect this U.S. building in the middle of Amsterdam. The perimeter line is a line of flower boxes, metal fences protect the approach zone, black metal fences protect the building exterior, and guards and surveillance cameras protect the building interior. Two police cars and a police office are surveying the whole site. The measures are as well temporary as long lasting. The police surveillance can be removed as soon as the threat is diminished, the perimeter line also, but the building exterior and interior security will probably be there as long as the consulate will be housed in this building.

The effect for the users of as well the site as the building is quite large. A big part of what used to be public space is incorporated (see figure 6.10d). And you have to pass three security points if you want to enter the building. There is no direct influence for car drivers or cyclists. But, the whole entourage seems pretty aggressive and can create a feeling of insecurity. Mostly because of the presence of so much police and other security measures. It attracts attention and can make you aware of the threat and make you think you are entering a 'no go' zone, which makes you enjoy the site and/ or building less.

6.4.2 Conclusion

Amsterdam only has one building which is highly threatened; the U.S. consulate at the Museum Square. Together with the U.S. embassy in The Hague, they represent the U.S.A. in The Netherlands. That seems enough reason to protect the buildings as much as possible. The building in Amsterdam is protected with all four security zones and is being surveyed by police at two sides of the building as well. The photographs show that the protection measures incorporate a part of what used to be public space also, which makes the site less accessible (Schilstra 2005).

There are not many buildings at high risk in Amsterdam, because there are not many national governmental buildings or buildings with an international function. However, there are a lot of events that get protected against possible attacks. '*Last January Iraqi elections have been held in Amsterdam. The navy area was protected with security measures better than normally. A street has been partially closed off, a bus stop has been closed, and we gave out some prohibitions for cars*', according to Schilstra (2005). These measures got a lot of resistance, because they have a direct influence on public space: '*After the Iraqi elections we got a lot of letters from complaining citizens. They had to make detours, they had to park elsewhere or could not use the bus stop*'.

The measures at the Nederlandsche Bank seem to be in good harmony with the surrounding; the flower boxes are stylish and liven up the site. '*In principle, we try as much as possible to incorporate the measures into the existing situation. That is why you see the flower boxes so much*', according to Schilstra (2005).

The following table shows the valuations, in terms of yes (+), neutral (0), or no (-), of the variables analysed in the different examples of Amsterdam:

	Symbolic value	Economic value	Design of pro-tection measure	Harmony with surrounding	Effect for pedestrians	Effect for vehicles	Create feelings of insecurity	Effect for urban design
Figure 6.9	+	+	+	+	-	-	-	-
Figure 6.10	+	-	-	-	+	-	+	+

Table 6.11 Valuation table variables case studies Amsterdam

6.5 Conclusions case studies in The Netherlands

The three case studies in The Netherlands have shown that also in The Netherlands, the protection measures differ as they differ in being implemented to protect state-owned or private objects. The example of Intrum Justitia (The Hague), Fortis Bank and the jeweller (both Rotterdam) are all examples of private parties implementing protection measures to protect their own property. And, although it has never been said, it looks like they have more money to spend on this. The measures are all incorporated into the design of the site or building properly, and do not really hinder any ones ability to move around the site or use the site freely.

The two examples of 'serious' protection measures are the U.S. embassy in The Hague and the U.S. consulate in Amsterdam. This is not very remarkable, since we have learned from earlier case studies done in the U.S.A. that most of the protection measures at stake here are of a serious kind as well. The Dutch examples both incorporate public space, and have far reaching consequences for the users of these sites or buildings. Pavements and cycle paths have been replaced, policemen, police cars, and police offices are also normal in these environments. Although it has not been measured or researched, accepted can be that these measures make you feel uncomfortable at least. They are not designed very pretty and they are too obvious being protection measures.

All of these case studies in The Netherlands have also shown, just like the case studies in the U.S.A. that the effect they have for pedestrians, cyclists or car drivers, depends on the way of implementation, the design and the size. If they are integrated into to overall design of the site to a certain degree, the effect is less than if they are placed rapidly or haphazardly.

7 Conclusions and recommendations

After having done the literature review and having made a theoretical framework in the first phase of the research, and doing the case studies in The U.S.A. and in The Netherlands in the second and third phase, this chapter tries to draw conclusions and give recommendations.

To draw conclusions, the research questions will be answered. Answering these questions will give an answer to the question if this research's goal has been reached. After the conclusions recommendations for the U.S.A. as well as for The Netherlands will be given.

7.1 Answering the research questions

In the introduction a goal has been set to have a better guidance in doing this research. It has tried to give a closer look on how terrorist attack protection measures are being incorporated in urban design principles, in the U.S.A. and in The Netherlands. Therefore, the goal has been:

To explore to what degree and in which way urban design in the U.S.A. and in The Netherlands can and, according to urban designers and the general public, may help to protect buildings and/or sites against terrorist attacks.

The following four research questions were the lead during this thesis. After each question, the answer will be given.

5. *What can be done in urban design to protect buildings and/or sites against terrorist attacks, and what has already been done?*

The question 'what can be done' was easy to find out by reviewing literature concerning terrorist attack protection measures and target hardening. Combs (1997) and Conrath (1999) say that implementing security can be done by implementing operational and/or physical security. Operational security (guards, sensors, closed-circuit television, and other electronic devices) has not much influence on urban design, because buildings and/or sites are not being built or altered for this. They are just 'added on' security measures. Physical security, on the other hand, has as its objective 'hardening the target against which an attack may be made' (Combs 1997). These measures are fortress walls, fences, Jersey barriers, bollards, gates, flower boxes or measures like street furniture, and have a direct influence on the city's urban design. They are easy to see and regard as protection measures. The protection measures can be implemented in four different layers of security: perimeter line, approach zone, building exterior and building interior (Conrath 1999). For this study's goal, only perimeter line, approach zone, and building exterior are important, because they have a direct impact on the city's façade. They can be seen from the streets and can influence the way people see or use the city and its streets.

The question 'what has already been done' could only be answered by doing case studies. In the U.S.A. and in The Netherlands, six case studies have been done to find out if, and to what extent physical protection measures have been implemented. It turned out that most of the buildings with implemented protection measures, are buildings with representative functions, like governmental

buildings, and consulates or embassies. Also, a lot of bank buildings are being protected, and whole financial areas like Wall Street and Battery Park in New York City.

The examples have taught us that the extent of threat for terrorist attacks is guiding for the extent of protection measures being implemented. In the U.S.A., the Wall Street area is the utmost protected. It has a big economical and symbolic value, and with the attacks of "9/11" in mind, it is totally closed-off for vehicular traffic. In The Netherlands, the U.S. embassy in The Hague and the U.S. consulate in Amsterdam are to the utmost protected, with four levels of security. They represent a real threat for the Dutch society, because they are regarded as being a part of the U.S. in The Netherlands.

6. *What, according to urban designers and the general public, can and may be done to protect buildings and/or sites against terrorist attacks?*

This question can be divided into two different parts; the urban designers and the general public. Interviews have been held with responsible officers from municipalities regarding the case studies. It turned out that all the officers have the opinion that safety is the number one goal in the task of protection against terrorist attacks. However, it is also their responsibility (or from their department as a whole, with a mayor being responsible in the end) to disturb public life as less as possible. According to the officers, you will always have to make a consideration between safety for everyone, and maintaining public order for everybody. You have to implement security measures, without a doubt, but you will also have to keep the quality of life of every citizen. Some protection measures do have an influence on how pedestrians, cyclists or car drivers can use the site and/or building. Among other influences, those measures incorporate public space or close-off streets partially.

A responsible officer of the municipality of Amsterdam told that a lot of citizens did complain about the security measures that were implemented temporary for the Iraqi elections in Amsterdam last January. They closed off a street partially, closed a bus stop, and gave out some prohibitions for parking cars. '*You will always have to justify the measures you are implementing, as long as you tell the citizens it is for their own safety, it is okay*' (Schilstra 2005). To a broader extent, the general public thinks it is good that buildings and/or sites at risk are being protected. But, on a personal level, they do not want the protection measures to influence their own private life.

7. *How do users of affected areas regard these terrorist attack protection measures?*

This question has been tried to answer by doing a questionnaire around the Sears Tower in Chicago. This questionnaire searched for citizen's perceptions of safety regarding the Sears Tower Site. It turned out that 78% of the participants regard the implemented measures at the Sears Tower Site as positive. However, still 39% said that they felt constrained in moving around the site freely. The protection measures stand in their way, or probably the cameras are being seen as 'intruders', instead of only improving their own safety. Again, users of affected areas think it is good and necessary that buildings and/or sites at risk are being protected. But, on a personal level, they do not want the protection measures to influence the way they can use the site and/or building.

8. How can, all in all, urban design as protection measure contribute to an increase in safety?

Urban design as a protection measure can surely contribute to an increase in safety. It prevents vehicle bombs from coming too close to a building and/or site. Or, it can harden the target. In the case of a bomb going off, the result (loss of life and capital) will be minimized, because a hardened wall will break the blast. This increases the level of safety. However, if only one building in a row is protected by physical measures, than it will only have an effect for that particular building. Not for the whole neighbourhood or area. The neighbour will also have to implement protection measures to protect his property against terrorist attacks. And, it will have to continue like that. Implementing measures at a site and/or building will only have the wanted effect on a larger scale, if more than one building in a neighbourhood will do the same. Otherwise, the attacker will move to your neighbour.

By this means, implementing these measures will contribute to an increase in objective safety. The attacks will not have the result the attackers aim at. The protection measure reduces loss of life and property. But, objective safety is not the same as subjective safety. By implementing measures, people can also be made aware of a certain threat. Without the measures they probably would not have known that they are approaching a site and/or building at high risk of a terrorist attack. That can make them feel more unsafe. That is a difference between objective and subjective safety. To conclude, urban design as a protection measure contributes to an increase in objective safety, but it has not been said that is also contributes to an increase in subjective safety.

With answering the four questions above, this research's goal has been reached. This study has explored to what degree and in which way urban design in the U.S.A. and in The Netherlands can and, according to urban designers and the general public, may help to protect buildings and/or sites against terrorist attacks. It turned out that the protection measures are nearly the same, and the way urban designers and the general public regard these measures is also nearly the same. The difference between the two countries lies in the extent of the threat for terrorist attacks to occur.

7.2 Recommendations

After having seen two different countries and the way and extent they implement physical protection against terrorism it may be useful to see if the U.S.A. can learn from the way The Netherlands is doing this, or vice versa.

In the U.S.A. the threat is conceived as higher, also because of their history of terrorist attacks on buildings and sites. And, maybe this legitimates their way of protecting buildings and/or sites at high risk. If we look at some examples in New York City and Washington D.C. the implemented security measures do contribute negatively to the urban design of these cities. They are not really designed nicely, and can easily make people more aware of a threat. This can decrease the subjective safety. Maybe, the physical protection measures discussed in these examples could be designed better, and by this means fit better into the existing situation. If the protection measures do less look like as being protection measures, than maybe people feel less unsafe and are less aware of a present threat.

For example, a jeweller in Rotterdam has implemented stylish artful anti-ram bollards in front of his shop. They do not really look like protection measures. The threat of being attacked is far less than

certain buildings on Wall Street, but the same protection measures could be implemented there as well. The Netherlands is doing well in implementing protection measures. That is obviously a consequence of a threat that is lower than is the U.S.A., but the measures that are implemented in The Netherlands look like they fit better into the overall design of the building and site. Only two examples are exceptional. In The Hague and in Amsterdam two buildings are to the utmost protected against possible attacks. They are an embassy and an consulate, from American origin.

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