THE ROLE OF ENVIRONMENTAL CRIMINOLOGY IN ARCHITECTURE

by

MARY BETH RONDEAU

Bachelor of Environmental Studies, University of Manitoba, 1979
Bachelor of Architecture, University of British Columbia, 1984
Member, Architectural Institute of British Columbia, 1992

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Department of \textit{School of Architecture}

The University of British Columbia
Vancouver, Canada

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ABSTRACT

Designing safer places is of interest to architects whose primary motivation is to create the best environment within the parameters of the design problem. Traditionally, since the time of Oscar Newman's theory of defensible space, architects have attempted to create safer places based on broad principles of surveillance and territoriality in the absence of detailed information on crime and nuisance activity. In the past quarter century, a large body of scientific research has been developed in the field of environmental criminology which illuminates the detailed circumstances as well as the background reasons of why crime happens. It is this thesis that this information is valuable to the practice of architecture and can be directly applicable. However, given that there is so little knowledge of crime out there, this information must developed into factual, well developed illustrations that allow the architect to develop a total framework of understanding. Once the framework is established and the architect incorporates the knowledge, it will take its place with the other numerous design parameters that compose the complex problem of architectural design. Architectural design, more that other types of design, is made up of both scientific knowledge and artistic knowledge. Incorporating this scientific research into the field of architecture must balance both endeavours.
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Introduction

This thesis examines the applicability of recent developments in the field of environmental criminology to the field of architecture. In the past 25 years, a significant body of criminological research on the environment and crime has been developed. This scientific inquiry has yet to find applicability to the field of architecture. In attempting to answer the question of why this research has not been applied to architecture, a broader question arises; what is the balance between science and art in architecture? At this point in history, any application of scientific inquiry to architecture must be treated with caution, given the overemphasis on scientific approaches such as functionalism in Modern Architecture. Even the most recent foray into applying the social sciences to architecture during the 1950's and 1960's has had minimal impact on the practice of architecture.

Research in environmental criminology suggests that crime happens in predictable ways, along pathways and at activity places where there is a presence of people who choose to undertake a specific type of crime. Knowledge of the typical and repetitive ways that crime happens will be of interest to architects who are involved in designing the built environment.

As with the social sciences, environmental criminology will develop a few useful principles that can apply to architecture. But these are not primary generators of the design, rather, they become principles to be taken into consideration as part of the overall design process. The design process itself has also been the subject of research during the 1950's and 1960's. It suggests that architects test design information rigorously before incorporating it into a pre-existing relational framework of knowledge. Therefore, the information available from environmental criminology will not be integrated into design until crime information is presented in a useable format that can then be put through the intuitive testing process of the architect. Frameworks of understanding must be developed from the raw crime data and research before it will be integrated into the worldview of the architect.
The goal of this thesis is introduce a body of knowledge about crime while allowing flexibility in the design process for the architect to decide the most appropriate application of this knowledge. In this thesis, practical suggestions are introduced for promoting readily available crime information, for improving methods of presenting criminological research findings and finally, for a design process that incorporates crime analysis.

CHAPTER 1 Science and Art

The field of environmental criminology offers a body of social scientific inquiry that has developed since the 1970's that shows that crime happens in typical and repetitive ways. However, there is a resistance to applying this information to the field of architecture due to the recent imbalance between scientific objectives and artistic objectives. We see scientific endeavours and artistic endeavours quite separately from each other. But this was not always the case. By looking back to early western history, a path can be traced to show why we see science and art as we do today.

The view of classical Greece was that the production of an object, as an imitation of nature, carried a divine import. There was not a word for art, there was only a word for the technique or the skill of producing the object. This is not the same as today where the production of an object could be for pure need or function. Nor would it be comparable to today where an object could be appreciated only for its artistic value. In ancient Greece, the admiration for the object incorporated the assumption that the divine was integral to the skill of producing any object because it imitated nature and nature was divine.

The Greeks distinguished between areas in which we could have true knowledge (episteme), and those which were mere collections of techniques or crafts (techne). The first does not really match any modern area of endeavour, and the second is roughly what we would mean by “art and craft.” Our modern terms “science” and “art” (in the most common sense of “fine art”) reached their present meanings only during the Enlightenment. (Stevens 1990, p.11)
Plato developed a rational system of reasoning and intellect. He separated things in the mind from things in the world and developed a theory of Forms and Particulars. Forms would be the divine, eternal, unchanging essence of a thing. The Particulars are the visible, sensible properties or characteristics that describe the Form. This achievement still influences western architectural thinking.

The earliest recorded thought on architecture was by the Roman author Vitruvius in the book *On Architecture* (c. 10 B.C.). The definition of architecture was quite different from today and included the art of building, making of time pieces, and the construction of machinery. Music and poetry were in a separate category that captured the divine through the imitation of nature. There was no recognition of the individual or the concept of art on its own.

In the medieval period, Augustine does give the architect higher status than the craft guilds, mainly out of respect for the application of rules and principles in an ordered, rational way that was necessary for the construction of a building of any scale. But Augustine borrowed ideas directly from antiquity, as did many of the thinkers of the time. There was a sense that the divine must motivate reason; “the clear light of natural reason” as Thomas Aquinas phrased it. Clear light being one of Plato’s purest Forms. Medieval scholars were driven by rational, platonic inquiry, which mixed science and art together and this mixture was seen to emanate from God.

It was in the Renaissance that architecture as a field and the individual designer began to be more identifiable. Perhaps it was the elevation of the state, with the success of the individual or family merchants in Northern Italy that changed the medieval view that all was created by God and for the glory of God. The Renaissance view began to focus on an idea of the well rounded, harmonious person; the humanist and the furthering of human existence. With the work of Leonardo da Vinci, Brunelleschi, Leon Battista Alberti and Andrea Palladio, these gifted masters were not just architects, they expressed beauty in numerous fields such as engineering,
painting, poetry, sculpture and these artistic endeavours began to be appreciated partially because of the genius of the individual. Thus, Plato’s pure Form is separated from the external divinity for the first time. Brunelleschi develops linear perspective, later documented by Alberti in *Treatise on Painting* in 1435. This is important because it detaches the individual as an observer behind the picture plane. Once separate, then philosophical thought can be rationalized as never before and this marked a shift from the medieval organic wholeness of the universe toward the individual. Humanism of this period still mixes science and art but it focuses on the person, not the divine. Architecture aligned with sculpture and painting during the Renaissance and cut themselves off from the craft guilds by forming the Academy of Art in 1563. Prior to this time, the classical way was to keep production separate from art, more as a craft and strictly as an imitation of the divine nature.

Through the work of Alberti in the *Ten Books on Architecture* in 1450, which imitated Vitruvius, the architect gains more status. This is not only in recognition of the rules and orders that are necessary to build a building but also because Alberti tries to define the charisma of architecture. Yet, the Renaissance, as a revival of antiquity, is a reinterpretation of Plato and Vitruvius, falling back to the classical ideals; harmony, order, arrangement, eurythmy (fit), symmetry, propriety and economy.

Brunelleschi began to experiment and construct. The idea of producing inventions that aided humankind through scientific inquiry developed further than previously. This experimentation sets the stage for scientific inquiry. Galileo carries this idea forward and takes a first step in abandoning Aristotelian need to find divine meaning in every scientific inquiry. Galileo does this by proving Aristotle incorrect about the stars and the universe, thus opening questions about what else might the ancient Greeks been wrong about. This emphasized the need to separate science from art so that science can answer questions untethered by religion, values, politics, folklore or witchcraft.
Perhaps the invention of the telescope and microscope best shows the progression of scientific inquiry and leads into the industrial revolution. The telescope and microscope irrevocably enhanced the most powerful sense being vision. These inventions became popular as a material good in Europe and created the need for mass production for the improvement of society. This reflected the mission of the Renaissance, to improve society. Admittedly, improvement of such was thought to be through the revival of antiquity. Nevertheless, their mission takes them to entirely new ground.

Rene Descartes developed the idea of the individual carrying clear innate vision. He begins at the beginning “I think, therefore I am”, an a priori statement. Descartes also emphasizes the separation of the mind and the body, the mental reality and the physical reality. Both of these endowments, firstly the individual now possessing divine qualities and secondly the separation of physical reality, allows pure scientific inquiry freedom to progress. This becomes the grand inquiry, the new philosophy and leads to the Enlightenment. Although philosophy and science are progressing, architecture is motivated by much the same Platonic ideals where the physical building can not be separated from divine intention according to classical imitation of nature. Isaac Newton seals the fate of the ancients as incorrect and unscientific. These Moderns of the Enlightenment become convinced that science will solve the world’s problems. As in Alexander Pope’s “know then thyself” (An Essay on Man, Epistle II), the idea of critical knowledge about humanity becomes the mission of the Enlightenment.

Until the 1750's, architecture continues to covet Platonic and Renaissance harmonies. Laugier publishes Essai sur l'Architecture in 1753. This takes the classical orders and simplifies them down to the basics of pediment, column and architrave as the most basic building elements. Boullee and Ledoux take that idea and simplify the forms still further. Although this sounds modern, it is still attached to Platonic idealism that proportion and harmony could not be anything other than those laid down by the ancient Greeks. The Ecole des Beaux Arts is assembled in 1819 with architecture alongside painting and sculpture, not engineering thereby keeping the science separate from architecture. The role of the architect is to design the floor
plan and ornament the structure according to ancient ideals.

The enormous advances in science and technology that occur in the industrial revolution seem to vindicate the philosophy of the time that science will save all. It was not until the use of steel and reinforced concrete had been tested on engineering projects such as bridges and factories that architecture had a venue to break from its own history. Architecture searched for a way to apply the new philosophy of science. But already, there are concerns with the pure and unsatisfying result of the grand inquiry. The Romantics of the mid 1800's, including Pugin and Ruskin, fell back to the medieval earthiness. Emmanuel Kant, a philosopher, provides a justification for romantic architecture as cognition or understanding, a sense of duty or conscience and an aesthetic taste or sensibility. By doing this, he brings the importance of the aesthetic up with the intellectual and moral. A moral and honest building being true to the materials of which it is built is also aesthetically pleasing. These principles are the forerunners of the Modern Movement in architecture.

At this time, William Morris introduces art into industrial production, which brings art to the common people not just the aristocracy. Science continues to have extraordinary success in explaining the world. It becomes clear that industry and science are here to stay. Pugin and Ruskin will be over ridden by a new architecture. The Ecole des Beaux Arts is replaced by the Bauhaus. In the aftermath of World War I, the battle cry of this architectural Modern Movement and later, the International Style, is functionalism, pure form (derived from Platonic Form) and honesty of structure and materials.

Yet architecture has yet to learn what philosophy has already glimpsed, that too much emphasis on pure science has limited artistic appeal or meaning. Science is not a solution, it is only the vehicle that takes you closer to the place you are going. Yet there is no disputing the amazing scientific advances in physics, structures, building materials and in the human sciences that change the built environment. The earth is not flat, the stars do not revolve around the earth and reinforced concrete is capable of cantilevering thirty feet.
Architecturally speaking, platonic proportions and symmetry based on the golden section which, at the time, stemmed from careful trial and error on unreinforced stone now has little relevance in the face of reinforced concrete, high tension steel, sheet glass, curtain wall, cantilevers, shear force, bending moments let alone the comforts of central heating, air conditioning and plumbing. The moderns are free to clear the architectural slate. Although Broadbent (1973) suggests that the work of the Modern Movement was rationalist with the ideas such as Louis Sullivan’s “form follows function” and Le Corbusier’s “the plan is the generator”. These could also be interpreted as science as the primary generator of the design. Yet for all the modernism of Le Corbusier and Mies Van der Rohe, the inside philosophy was still platonic. The new materials were used to express the high idealism of pure simplified form. At the same time, humanity is not quite pulling up to the standards of the perfect mechanized society envisaged by the Enlightenment. They continue to be irrational and, in fact, the Avant-Garde revel in it.

The study of humanities is under pressure to be more scientific. The traditional hermeneutic approach of piecing together fragments of history and making a value judgement to complete the picture is by its very nature personal when science shows that it must be detached. Edmund Husserl (1964) helps to resolve this by saying that science, with all its objectivity, is only one reality. He provides a foundation for scientific thinking by beginning with the individual “a priori” perception of the phenomena as the valid starting point, no longer for the Gods alone to perceive. This approach becomes known as Phenomenology. But the European community was still reeling from the sheer meaninglessness of it all, the first world war has emphasized the lack of success of the grand inquiry, the new philosophy and industrial materialism.

Architecture takes up the idea of phenomenology, developed by Christian Norberg-Schulz (1980). This approach suggests that place can be understood by discovering how individuals understand and relate to it and by what it means. It encourages the investigation of human actions and meanings and gives a reason or direction to scientific inquiry. Architects should
abandon *designing spaces* and *make places* suggests Sime (1986).

As an alternative to phenomenology, the area of structuralism has developed as a way of looking at the world as structures. A structure has three qualities; wholeness, transformability and self-regulation (Hawkes 1977). The study of linguistic structure flows out from this with the development of semiotics. But of importance is that, different from phenomenology and hermeneutics, structuralism focuses not on the meaning that the individual perceives but on the various meanings taken from the object itself. Hermeneutics focuses on the intended meaning of the author, structuralism focuses on the emitted meanings.

Architectural interest in semiotics helps to show the weaknesses of the functionalist modern movement that said that pure function lead to a pure form, with a value higher than stylistic meanings. Semiotics shows that all objects signaled a meaning to the observer, like it or not. Architecture could never be free from style and never above meanings. Architectural structuralism is best illustrated in the work of architects Louis Kahn, Kenzon Tange and Aldo van Eyck. Jencks and Baird developed the idea of semiotics in North America in the book *Meaning in Architecture*. Umberto Eco (1968) considered architecture to function as a form of mass communication, whether it refers to a specific code of communication or general, whether referring to specific cultural meanings or broad cultural meanings. Post-modern architecture as defined by Jencks (1977) utilized semiotics playfully but this was a passing phase. The silliness of post-modernism does not last and what is meaning anyway? The Post Structuralists next deconstruct this question.

Structuralism was doomed by the limits of its too structured logic. The post structuralists, called that name only because they come after structuralism and are different than structuralism, not because they need to band together for security or to push their message, because to do so would be exactly against what they are saying. They showed that the meanings attached to objects are not real either, they are not pure, they just reflect the influence of a certain societal programming. All previous philosophies tried to lay down some
certainty, to give a sense of security that we know who we are and what we are doing. Michel Foucault (1973) shows so clearly that the field of medicine is riddled with assumptions that ensure its own success. He suggests that the human body is structure and processes enveloped in skin. Discourses establish known things but they can not be influenced by societal reality because that does not exist. Jacques Derrida (1986) looks at sign systems such as language and suggests that they do not get meaning from the world but from each referring to the other. Therefore these signs, freed from the value placed by the world are free to be interpreted any way at all. Using the hermeneutic method, except in reverse, by taking the text and deconstructing it shows how it spreads out into unending cycles of uncertainty. All previous philosophy is misguided because it assumed the real world was not discriminatory, that it was real therefore it was.

In today’s post-industrial era, architecture is still recovering from the focus on science, not just in building technology but in the type of thinking that architects have developed to embrace those scientific advances. There is a sense that purely artistic endeavor will not prove out in materials or technology. For example, a chosen design for a building may successfully reach creative peaks but if it leaks water and needs continual maintenance, it fails in a different way. In the last twenty years and since the Modern Movement, architecture has certainly exhibited a struggle to resolve scientific advances and regain a balance of artistic intention. Any science that now tries to apply to architecture must give wide recognition to its place as a background ordering principle, not a primary generator of architectural form. Yet, the success of scientific inquiry must also be accepted and incorporated into design.

It is at this point that environmental criminology has now completed over a quarter century of scientific inquiry. These important advances now need to be interpreted into a meaningful contribution to the built environment. But with a reaction against scientific inquiry and the search for meaning, the field of architecture is resistant to incorporating the information that environmental criminology has to offer. Therefore, the method of introducing environmental criminology to architecture is important to consider.
CHAPTER II  Environmental Criminology as a Social Science

Criminology, as a field, became known in 16th and 17th centuries but the study of crime has existed as long as laws have defined what a crime is. As a science, the approach and emphasis of the field has changed over time. Initially, the classical school of criminology could be described as the deterrence model where punishment was considered to be the cure for the crime. This changed during the 19th century, where it was thought that a better understanding of the reason why the crime happened would cure it. This is known as positivism and this approach has continued to play a significant role in criminology through to the modern era. It was in the early 1960's that the role of the environment became a focus of some criminologists. This paralleled other social sciences that were turning to the study of the environment.

2.1 Background and Early Influences

In North America, the work of Jane Jacobs had a major influence on the shift to considering the role of the environment in crime. Her pioneering book, *The Death and Life of Great American Cities* (1961), dealt holistically with the functioning of the city, from built and planned form, to property uses, to the lives of the people who lived there, to community organizations, all of this over time. An essential part of this was her intuitive vision of safety in the city. The idea that mixing uses will allow both residents and businesses to have a stake in the street “ballet” daytime and nighttime. The idea that a vital street activity is one that people will engage in, will watch from the windows of their apartment buildings and therefore make the street safer with “eyes on the street”. An idea that is not so well accepted is the idea that city blocks should be as small as possible to allow as many people as possible to circulate through and therefore made safer. Many aspects of this interpretation of the city are still valid today, especially the safety idea of “eyes on the street”. It was Jacobs’ ideas of how healthy cities could function and be safe that expressed the trend of considering the physical
environment not just as it related to crime and safety but to other social sciences.

It was her recognition that great cities were built on the relationships of strangers. This emphasized the vulnerability of cities and therefore the importance the city as a place where people's relationships could be nourished in a safe and healthy environment. The key physical components of this healthy vision were the sidewalk that was wide enough to support the people and play, the business and residents that would overlook the sidewalk and the use of small city blocks where people and cars could circulate easily. She included the ideas that people needed privacy and that creating a sense of neighbourhood should not encourage people to claim turf thereby excluding others. The primary impact of Jacobs, was that she got people who were already interested in the social sciences, including criminology, to consider the influence of the physical environment.

Oscar Newman, an architect, referred to Jacobs' work in his book *Defensible Space* (1972) where he proposed environmental design concepts to prevent crime. Newman had a unique opportunity to gain a first hand knowledge of the details of crime occurrences in large, low income housing projects in New York City at a time when these housing projects were proving to be large scale disasters in terms of "healthiness".

The conclusions of Newman's analysis of crime suggested that crime happened more in places where no one took possession of the space, where no one had an opportunity to watch a place, where the street grid was interrupted and isolated from users and people passing by. These conclusions had some similarity to Jacob's views. Newman proposed that spaces must maximize surveillance, they must have an identifiable progression of spaces from public, semi-public, semi-private to private as "defensible space" and must create a sense of ownership or territoriality for the residents. A clear example of the power of creating a sense of territory was in the Pruitt-Igoe public housing in St. Louis. One tower had a construction fence left standing around the perimeter, where people felt safe enough to use the space and where there was noticeably less crime in comparison to surrounding, similar buildings without the fences.
Another example showed less crime in buildings that were smaller scale and ground oriented, where densities were similar to large scale high rises and yet the crime levels were lower. Newman attributed this to the residents having the ability to watch the outdoor spaces from their units and having a sense of ownership of the entrances and lobbies shared by only a few other families that they could get to know.
Gating was considered by Newman to be a form of territorial marker that would keep out those people that would try to undertake criminal activities. Another idea that Newman began to develop in his book was that high-rise buildings caused more crime.

Today, Newman’s ideas are considered simplistic and with designs that promote excessive gating, they are considered to be more harmful to the urban environment than helpful. An important lesson learned from Newman is that while the crime analysis may be useful, it is the
value system of the individual designer that leads to design solutions. This is especially evident with Newman’s gating solution that is contrary to Jacobs’ vision of long term healthiness and sustainability of the city. High-rises have pretty much proven not to be more criminogenic than other building forms. However, while some of Newman’s ideas have been discarded, the elements of defensible space remain accepted and intact to architects.

While Newman undertook research as an architect on public housing crime, the field of criminology was taking important steps. In the United States, an important book, *Crime Prevention Through Environmental Design* (1971) was written by C. Ray Jeffery. With a background in sociology and criminology, Jeffery’s book was published at much the same time as Newman’s. He showed that the classical school of criminology, which used deterrence or punishment as a means of stopping crime, had been ineffective given that behavioral research showed that punishment was effective only if it was swift and certain. He showed that behaviour is adaptive to the environment so that model behaviour in a prison did not mean that this same behaviour would be exhibited in a different environment after the prison term.

Punishment via the legal system was not swift or sure particularly given the volume of all types of crime, from serious to petty. Jeffery suggested petty and non-violent crimes may be better dealt with by informal social controls rather than the legal system. An example of a response to dealing with petty, quality of life crimes is the Midtown Community Court in New York City, where a unique community arraignment court was created for misdemeanors such as shoplifting, prostitution, graffiti, low level drug possession, petty larceny and unlicensed vending (Kelling and Coles 1996).

Jeffery’s work was done at a time when rehabilitation of the criminal or the “positive” school was most popular. He showed that this concept of the offender as a sick person who could be reformed by education and therapy was also not effective given that we did not have enough knowledge about the mind and the environment to reform people. In the deterrence and rehabilitation models, the environment was a factor in the occurrence of crime yet it had not been considered in any detail. Jeffery suggested criminology must now turn to the environment
of the criminal event and learn what role it had in the commissions of crime.

2.2 Reaction to Newman’s “Defensible Space”

In Britain, research on crime had already turned to the environment. There was swift critique of Newman’s assertions in an attempt to prove that Newman’s thesis was incorrect. Bottoms (1974) wrote a review of Newman’s book and suggested that some of the buildings were conveniently left out of the analysis even if they fit the criteria for comparison. The socio-economic statistics of the people living in the public housing was also left out. The offender rates (the number of offences committed during a given time by offenders living in that area as opposed to outside of the area) were not included, and offenders were considered simplistically as perpetual offenders or “others” from outside the public housing.

Mawby (1977) suggested that Newman’s work was theoretically flawed, that he jumped too fast to conclusions that defensible space would solve a panacea of problems. Mawby was also concerned with the conclusion that high rise towers were crime ridden when Newman did not look at socio-economic variables and did not look at offender rate. Mawby suggested that Newman oversimplified the theory of defensible space, surveillance and territoriality and supported his conclusions with crude calculations of crime occurrences. He also suggested that Newman left out some data about high rise towers when it did not appear to confirm his theory about higher crime. He considered Jacobs and Newman similar perspectives as intuitive but at least Jacobs acknowledged her approach. Newman, on the other hand, defended his flawed work. In his own study of high rise estates in Britain, Mawby found that high rises were not crime ridden because of the building form, it was more because of the level of poverty. He also suggested that if space outside a dwelling is defined and defensible with fencing and shrubbery, this can provide cover for break and enter type crime (areas of concealment).

While those in criminology did not appreciate Newman’s work, it was a tremendous success
with design professionals around the world. The idea of defensible space, creating space that is watched and owned by people with a stake in the neighbourhood, remains accepted by design professionals. Poyner (1983) built on Newman’s principles in his book *Design against crime: beyond defensible space* where he also suggested value laden solutions for designs that could prevent crime. For example, Poyner suggests that areas of wealthy and middle class housing should be separate from poorer housing because the crime is generated in the poorer areas. He admitted that this may be unacceptable to planners and politicians. Solutions such as these do not withstand the Jane Jacobs test of whether the city as a whole will be better off in the long run with such a design.

Another author that was influenced by Newman was Alice Coleman. In her book *Utopia on Trial* (1985), she selects Newman’s principles of anonymity, lack of surveillance and presence of escape routes as the primary reasons for social malaise in housing projects in Britain. She undertook apparently “scientific” research by cross referencing physical signs of disadvantage such as litter, graffiti, vandalism and excrement with design features such as the size of the project, circulation, entrance to units and features of the grounds. Her particular concerns were high rise buildings, overhead walkways and lack of privacy definition for ground level residential units. She built on Newman’s flawed research on high rises and did not include crime rates or socio-economic variables such as poverty. Numerous authors have disputed her findings (Hillier and Shu 1998, Fairs 1998). If there is validity to Coleman’s charges, it falls with the extreme ideology of modern architecture represented by the Radiant City of Le Corbusier and the Garden City of Ebenezer Howard. The predominant result of these urban forms of satellite suburbs and tower blocks being inhospitable and unlivable.

In the meantime, criminologists set off to develop a body of research on crime related to the environment starting in the early 1970’s. The field of environmental criminology developed in the early 1980’s. Yet for architects, this research remains relatively unknown. The following section highlights this criminological research so that an approach for application to architecture can be developed.
2.3 A Quarter Century of Inquiry in Environmental Criminology

2.3.1 Research on Vandalism

The research suggests that vandalism is the work of adolescent boys, between the age of 10-15, that involvement in vandalism is linked with other delinquent behavior such as theft and mischief with some link with socio-economic status (Clarke 1978). Vandalism is often carried out in groups, sometimes for economic gain (money) such as stealing change from paper boxes. The motivation for vandalism is an aggressive act that may give a sense of control and it is mostly a game that can be won easily (it is rare to get caught and suffer consequences). Some studies suggest that vandalism does not correlate with broken homes. Vandalism was found to occur in places that were not "owned" or watched by "guardians" whether informal (neighbours) or formally (employees or security personnel). It happened more on pathways where there was a presence of the young males.

Sheena Wilson in Clarke (1978) tried to test whether Newman’s principles had an impact on the level of vandalism in Britain. That is, she studied different building forms from houses to low rise flats, to tower blocks and collected information on the levels of vandalism. The highest correlated factor was the child density, the more children, the higher the vandalism. Socio-economic factors were not part of the study due to insufficient scope. The findings were that;

- relatively small amounts of damage were found on the private dwellings themselves rather it was found in semi-public or communal areas that were not owned by the individual,
- levels of observed vandalism were high on large scale projects with extensive semi-public areas that could not be easily supervised by residents,
- high-rise blocks experienced more vandalism in ground floor communal areas,
- in low child density blocks, vandalism was greater if entrances were impersonal and used as a through-way to other locations (a cut-through or pathway).
The study also indicated that spaces that were not owned suffered more vandalism than those which were owned. The most common type of vandalism was broken windows to the point that windows were being removed. There was also a question that there was displacement of vandalism to elevators if there were no windows to break.

Patricia Mayhew (1979) looked at the way surveillance impacted vandalism in public areas and on telephone kiosks (booths) in Britain. The study showed that the number of windows overlooking the kiosk had a low correlation with the amount of vandalism. The highest correlating variable was the presence of council housing (government-subsidized housing). She suggests surveillance does have a small impact on crime but that the chances of a watcher taking action is low and depends on the role of the watcher i.e. police, security personnel, residents, working people in the public as employees (bus drivers, car park attendants), or general public. Surveillance works best when it is formal, by employees or monitored cameras. She suggested that crime such as vandalism, like most types of crime, is relatively rare making the chances of anyone seeing the event unlikely. Mayhew suggests that Newman’s work gave too much weight to environmental factors when these broad categories of defensibility, surveillance and territoriality are complex and that the environment can impact crime but only in very specific circumstances.

A study by Zimbardo (1973) suggested that vandalism left unchecked lead to more serious types of crime such as minor theft. In the mid 1970's, in the state of New Jersey, funding was provided for a project put police foot patrols back on the street. Five years after the project, an evaluation of was published by the Police Foundation, which concluded that crime rates had not been reduced. In an article in the Atlantic magazine, James Wilson and George Kelling (1982) suggested that the foot patrols had been successful in spite of this because they had reduced fear of crime and had increased maintenance of order in public areas. They suggested that although people feared “a sudden, violet attack by a stranger” (Ibid. p. 29), they also had fear “from a sense that the street is disorderly, a source of distasteful, worrisome encounters” (Ibid. p.31). They supported Zimbardo’s work by suggesting that, over time, crime and disorder
are linked by a developmental sequence, starting with the most simple levels of disorder, both physical and social, and leading to theft and, on occasion, violence. Therefore, by maintaining order in public areas there will be less escalation to other, more serious types of crime. Skogan (1990) established this developmental sequence between disorder to more serious types of crime. He found that, with those surveyed, there was agreement about what constituted disorder and how much disorder was present locally. He also found that disorder was statistically linked with crime, more than other characteristics such as poverty and instability in the housing market.

In *Fixing Broken Windows* by George Kelling and Catherine Coles (1996), a number of successful projects were outlined. Specifically, the New York City subway was one of the first projects where order maintenance was employed. Early on, swift and certain removal minimised graffiti. The epidemic of homeless people living in the subway was addressed by integrated problem solving between involved agencies including the transit authority, the police, the mayor's office, as well as community groups, civil libertarians and advocates for the homeless. Agreement was reached between these diverse groups on actions that could be taken that would improve the situation. This was not without extensive legal struggles, but eventually, order was established in the subway system. More serious types of crime also fell substantially. The steps of this problem solving technique are summarised;

Step 1: Problem identification

Step 2: Identify possible programmatic changes

Step 3: Examine the viability and impacts of such programmatic changes

Step 4: Ensure all involved agencies or groups buy into the goals and plans for change

Step 5: Review existing regulations and programs against proposed changes

Step 6: Ensure legal, moral and political impacts are envisaged; prepare to win in court

Step 7: Establish an accurate feedback mechanism.
Car crime primarily falls into 2 types; stealing from cars and stealing the car itself. Although these are both car related, the motivation for each and the characteristics vary slightly. Stealing from cars tends to be much more prevalent and opportunistic than stealing of cars.

Webb and Laycock (1992) provided an interesting historical perspective of securing cars in Britain. In the 1920’s there was a law against securing cars so that they could be moved if they were blocking streets due to a lack of parking spaces. This was changed in the 1930’s when cars became mass produced and car security was more important. This illustrates how the definition of crime changes over time.

Light, Nee and Ingham (1993) studied the offender’s perspective of car crime in Britain by interviewing convicted thieves. Again, confirming other findings, the offender was found to be mostly males, ages 14 – 35, offending peaks at age 20, stealing mostly for excitement then at a later age, stealing for financial gain. Generally, stealing was influenced and undertaken by groups. Desistance was also studied where offenders suggested they had stopped stealing because they grew out of it, they did not want to go to prison or that they had a girlfriend. Choosing a location to steal was found to be on the street or public car parks but they also found that almost half on the offenders said any location was acceptable even though police records showed the locations noted as the most prevalent. Timing was mostly anytime, then secondly at night. There was a sense that location and timing influenced each other. For example, at night, stealing from the driveway of a house would be considered but not during the day.

Barry Poyner (1992), an architect, looked at crime prevention in parking facilities in Britain. In 3 open parking lots, initial improvements to natural surveillance by increasing lighting at night and lowering landscaping had minimal reduction of crime. The introduction of closed circuit television (CCTV) and security personnel watching and ready to take action in 2 of the 3 lots...
had significant reduction on crime not only on the 2 lots with cameras but also on the third unwatched lot. This proved the effectiveness of deterrence that is swift and sure by formal surveillance and action. Poyner attributed the “positive effect” to transfer to the third parking lot.

In another example, Poyner studied a parking garage and 2 adjacent open parking lots in Dover, England where vandalism and theft were a problem. There was significantly more crime in the garage as opposed to the open lot which Poyner attributed to lack of natural surveillance. By fencing in the lower levels of open parking garage, gating the exits, improving the look of the elevator entrance lobby and, most importantly, by improving surveillance by leasing out a ground floor section of the garage to a taxi company, crime was reduced. It is interesting to note that there was a slight reduction in car crime in the 2 adjacent open parking lots, implying the same positive effect to the open lots and that there was no local displacement from the garage to the lots.

Poyner and Webb (1991) studied car crime in housing in Britain. They found that large scale target hardening (making the target more difficult to break into by locking, reinforcing etc.) initiatives such as steering column locks installed by the manufacturers was initially effective, that theft was not uniformly distributed related to public housing projects. The study was limited to observing only environmental factors rather than demographic indicators such as socio-economics and number of children. Of the public housing studied, the projects that experienced high car crime levels appeared to have communal parking rather than individual garages. Where individual cars were left unwatched by the occupants of the houses, crime levels increased. Pathways passing by the communal parking lots also increased crime. Theft from auto was considered with the results of the study being similar to car theft; that houses with individual parking and good surveillance had the least theft from cars.

Fleming, Brantingham and Brantingham (1994) in a study of theft of auto in Vancouver, B.C., found that the majority of cars being stolen were by young teenagers for “joyriding” rather than
an organized effort by older, more experienced thieves. The primary motivation for stealing was found to be the thrill and the market for used parts for older cars became dependable. The penalty for stealing cars was low at the time due to the attention of the courts being directed at violent crimes of young offenders rather than property crimes. The young thieves showed a preference for parking garages and car dealership lots as places to steal from. Although a study of the victims showed that the majority of cars were stolen from homes or parked on the street, at nighttime and in well lit locations such as under a street light so the offender could see better. Again, this runs counter to what some people consider as a well-lit location being less prone to crime. Parking garages ranked second to the street in prevalence for theft location. The study found that the offenders felt the best deterrent for car theft was “target hardening” with car alarms or steering wheel restraints.

In a study of car crime in parking garages in Vancouver, B.C., Rondeau and Graf (1996) found that stealing from cars was 3 times more prevalent than stealing of cars, that both property and violent crime was higher in public parking garages than residential garages but that the rate of violent crime was insignificant in both. This finding suggests that contrary to fear of being mugged or assaulted in parking garages, that actual risk to person is very low. Fear of crime is sometimes contrary to actual risk. Bicycle theft was also high in both types of facilities.

Stealing of and from cars are prevalent crimes, again, mostly undertaken by young males in their teens and twenties. The studies by Barry Poyner express the importance of proper management through formal security measures where the design was less important. This is a constant question about how much formal security is too much toward a police state and what are the circumstances where shifts in the treatment of the environment can reduce a lot of crime. The idea of pathways where more crime occurs is also important. Stealing from cars tends to be more opportunistic, can be done quickly and with relative privacy in parking garages. The goods to be obtained can be quickly marketed for small amounts of cash often used to support a drug habit. Stealing cars tends to take a certain amount of skill and planning and is less prevalent than stealing from cars. Joy riding is the most common reason for stealing
cars. In British Columbia, there appears to be few “chop shops” for marketing car parts or for the entire car.

2.3.3 Research on Break and Enter (Burglary)

In a comprehensive study of burglary in Texas, Cromwell, Olson and Avary (1991) studied the habits of burglars and the houses that they or their cohorts broke into. The main reason for stealing was for money. That is, money to live, to keep a family, to maintain a vice such as gambling or heroine addiction, or to have a fast lifestyle. Some burglars stole for kicks or excitement and some also stole because of pressure of the group. Cromwell refers to a Bennett and Wright study in Clarke (1984) where burglars were found to have 3 typologies; planners select targets well in advance, searchers reconnoiter an area seeking out a suitable target and the opportunist acts on a selected target there and then. Most experienced burglars were not found to be opportunistic. This is more likely to be young teenagers that were not part of Cromwell’s study.

From an offender’s perspective, Cromwell found that deterrents are consistently claimed as;

- house being occupied by people,
- dogs in the house,
- accessibility to a covered place to break in i.e. the back or side (area of concealment),
- visibility to neighbours and passers-by (surveillance),
- poor escape routes.

Hope (1984) discusses cues and cue sequences emitted by the environment as suggested by the Brantinghams (1981) and environmental risk factors reviewed by Winchester and Jackson (1982). These risk factors were tested against the break and enter and found that houses that had been victimized were more likely to have a higher number of environmental risk factors.
Hope suggests risk factors are;

- distance from other houses,
- overlook from other houses,
- public views obscured by bushes, trees, fences and setback from the road,
- access from the rear,
- adjacent land uses that did not provide overlook.

Brown and Altman (1981) also looked at the sociological issues of privacy and territoriality as they relate to burglary and how burglars perceive the cues and markers of territoriality. They suggest that territory is defined by primary areas as the most private with the most personalized markers. Secondary areas are semi-public, perhaps shared by a strata corporation with markers such as gates or signage. Public areas rarely have any personal markers except by clubs or neighbourhood groups. Their hypothesis is that burglars would make a series of sequential judgements about territorial qualities of a neighbourhood, site or specific building.

The work of Macdonald and Gifford (1989) in Victoria, B.C. used Brown and Altman’s definitions of territorial markers to have burglars assess photographs of single-family houses and assess the attractiveness of the houses as potential targets. The easily surveillable houses were rated as the least vulnerable. However, the territorial markers showing ownership and defensibility did not make a house less vulnerable. It was suggested that people who care about the exterior of their house possess goods that make the house a good target.

Wright and Decker (1994) undertook a field study interviewing active burglars in St. Louis, Missouri. The burglars were predominantly young, poor males that chose to commit a burglary primarily to obtain enough money to support a high-living lifestyle which included illegal drug use. The selection of targets was made during routine day-to-day activities. The physical cues that attracted the burglars were the homes that were perceived to have the biggest payoff in terms of goods; the size of the structure, the level of maintenance and ownership of flashy cars.
These burglars sought homes that were not occupied and chose entry points that were reasonably concealed from public view.

In summary, break and enter is difficult to stop by the police since it is quick and generally does not leave a trail to the offender. Break and enter is prevalent and is likely be displaced from one building to another building that is more vulnerable. There is a strong sense of violation of the person that owns the property particularly residential break and enter. Much of the research of break and enter is on residential single family dwellings which constitutes only one type of building form and therefore more research is necessary to be useful to the field of architecture which generally deals with larger scale forms. Many of the questions of how it can be stopped involve root causes such as upbringing, reducing motivation to steal and enforcement. Suggestions for design of the environment are to reduce areas of concealment outside of doors and windows, keep these visible to the street and to neighbours that can watch. Target hardening such as providing locks and hardware also reduce crime.

2.3.4 Research on Robbery

Maurice Cusson in Cornish & Clarke (1986) studied robbery in Montreal, Quebec and focused on the reasons for eventual desistance. Feeney in Cornish & Clarke (1986) studied robbers as a type of angry burglars that want to have control over people as part of the thrill of doing the work so they escalate to robbery. Although robbery is for material gain, called an economic crime, it has added excitement. It appeared that robbers do not want to hurt anybody, they want the sense of power and use weapons to establish control over the victim. The rational choice of the robber is figuring out who to rob and what methods to use for persuasion i.e. choose a woman that is not as strong and use a weapon to show that you are serious.

Gabor et al (1987) discuss armed robbery trends in Canada and the United States. They show that both countries had an increase in robberies in the 1960's and 1970's but that Canada had a consistently lower armed robbery rate. Within Canada, the province of Quebec had
significantly higher rates of armed robbery than the other provinces. Their study in Quebec suggested that the vast majority of these robberies were concentrated in the two urban areas of Montreal and Quebec City. The detailed study suggested that the offenders were almost exclusively males with an average age of 21 years old. They found that the majority of victims were female. The locations of the armed robbery were banks, financial institutions and convenience stores. Only 17.3% of the robberies were mugging of individuals and of these, the majority of the individuals were taxi drivers and parking lot attendants. There were few random mugging of individuals on the street or in public places. Interestingly, the monetary gain from robbery was an average value of $100, which is comparatively low considering the risk of injury and the stiffer penalties for this crime. Gabor et al. suggested that the motivation for this primitive crime, other than for quick cash, was described by those interviewed as a heightened sense of euphoria that came after the completion of a successful robbery.

Wright and Decker (1997) studied armed robbery in St. Louis, Missouri. They found similar results through interviews with active robbers. The primary reason for undertaking robbery was to obtain cash usually to buy drugs or entertainment. However, they observed that it was not just financial gain that motivated these offenders, it was also the attraction of a lifestyle that prolonged involvement with the self-indulgent street culture. They found that the choice of target was more typically other local criminals such as drug dealers that carry cash or people that obviously had ready cash. The targets were rarely selected away from the home neighbourhood. The interviews showed that the best physical setting for the robbery was a place shielded from public view with good escape routes. Few of the offenders interviewed intended to harm or kill their victims but creating the illusion that such was their intention was an important part of committing the actual crime. Interestingly, Wright and Decker suggested that a way to prevent armed robbery was to move toward a cashless society.

2.3.5 Research on Fear of Crime

Alluded to in the discussion on car crime was the idea that people’s fear does not always
reflect the proven risk of crime. In underground parking people have fear of being attacked by someone they do not know when the actual risk of being attacked in these locations is significantly lower than on specific street locations in the city. This is a very important point when designing to reduce crime. So much of the work that flows from Newman’s theories made a fundamental error of not separating fear of crime from actual crime. This may roughly be related to the discussion on science and art. A person’s feeling or intuition is counter to what scientific inquiry will prove.

For example, safety audits have become popular. This is where a group of people, mostly neighbours will walk an area of their neighbourhood, daytime and nighttime and look at places where they feel fearful or unsafe. A safety audit checklist developed by the City of Vancouver Safer City Task Force is attached in Appendix A. This audit process promotes community involvement and caring which is an important first step for crime reduction but trimming bushes and increasing lighting rarely has impact on actual crime. The safety audits tend to focus on bushes and lights, when research suggests that there are more important physical determiners of crime such as pathways, activity nodes and a presence of high-risk populations.

Feelings of fear are important because they influence the way people use the environment. When looking at locations of violent crimes, they do tend to happen in out of the way places, but not just any out of the way place. The more important determiners of crime, whether property or violent, has to do with pathways which carry high-risk populations. Bonnie Fisher and Jack Nasar (1992) found that prospect and refuge are key perceptual basics for humans to feel safe and that escape routes are important (Appleton 1975). To feel safe, a basic necessity is to have prospect or clear visibility from a safe place or place of refuge to feel that one can escape from trouble; to have an escape route. It is important to recognize that this is a human trait, for both offenders as well as non-offenders. This is well described in the book, The Experience of Landscape by Jay Appleton (1975);

It is early one Sunday morning at the beginning of March, when Easter is already in the air,
and we are taking a walk in the forest whose wooded slopes of tall beeches can be equaled in beauty by few and surpassed by none. We approach a forest glade. The tall smooth trunks of the beeches soon give place to the hornbeam which are dotted from top to bottom with pale green foliage. We now tread slowly and more carefully. Before we break through the last bushes and out of cover on to the free expanse of the meadow, we do what all wild animals and all good naturalists, wild boars, leopards, hunters and zoologists would do under similar circumstances: we reconnoitre, seeking, before we leave our cover, to gain from it the advantage which it can offer alike to hunter and hunted - namely to see without being seen. (From Konrad Lorenz, King Soloman’s Ring, 1964 edn. consulted. Methuen: London as cited in Appleton, 1975, p. 58.)

Fear is increased (not necessarily risk) where there is a sense of refuge for a potential offender e.g. a pathway that is too close to dense hedging. Nasar and Fisher also suggest that even if there is good prospect and no refuge for an offender, a victim and offender still needs an escape routes to feel safe. This was tested on the Wexner Center for the Visual Arts at the Ohio State University campus, designed by architect Peter Eisenman. Nasar and Fisher showed that fewer users would go onto a plaza that leads to an unsafe place after dark than they did during the day. This study did not include actual crime occurrences so the question of how risk impacts a fearful place was not addressed. An interesting further study would be to undertake a crime analysis that considers the actual crime risk.

Nasar and Fisher (1993) studied hot spots of fear. They suggest that humans often over-react to potential danger thereby increasing the chances of survival in the unlikely event that real danger arises. Fear happens at different scales, i.e. fear of a city or country when planning a trip or at the micro level, when walking beside bushes in an isolated area at night. Mental maps or cognitive maps contain fear locations. These are affected by social characteristics i.e. drunken, scruffy people, or by physical disorder such as graffiti, broken windows and garbage.

At a macro level, Brantingham and Brantingham (1986) suggest that there are objective crime patterns such as police crime statistics and perceptive crime patterns. Perceptive crime patterns relate to what people perceive crime to be or fear of crime. Perceptions break down into categories: concern with crime, fear of criminal victimization, feelings of safety, and
ecological labeling.

Concern with crime measures how people rank crime as a social problem compared with other problems such as poverty and unemployment (Furstenberg 1971). Fear of victimization measures an individual’s estimates of crime trends in the nation, in the city, in their own neighbourhood and victimization to their own person. Some studies show that people often have perception of crime levels in the city similar to the objective measurements but this has not been a consistent finding (Conklin 1975). There is a tendency to hold crime at a perceptual distance. For example, the feeling that crime is up in the city but not in your neighbourhood (Hindelang et al 1978). People also tend to feel that those committing the crime are outsiders of the neighbourhood.

Feelings of safety measures whether people feel safe in specific places. According to findings of the U.S. Law Enforcement Assistance Administration’s National Crime Survey (NCS) in the mid-1970’s, nearly everyone feels safer during the day than at night and people generally feel safe in their neighbourhood. Ecological labels are expectations of particular behavioral patterns that people attach to specific places, such as ghettos or skid row. These are part of the cognition of place i.e. cognitive maps. Ecological labels are the basis for work on the spatial distribution of crime started by Shaw and McKay (1929). The labels can sometimes influence the actual crime rates of an area.

In the Brantingham study, the West End neighbourhood of Vancouver was the study area. They found that residents of the West End felt that their neighbourhood had higher crime than others, that offenders were from the neighbourhood, and that they were likely to be a victim of break and enter. In fact, objective crime statistics showed that the West End crime levels were similar to other areas of Vancouver. The study found that residents felt safe at home, that people felt a part of the community but not close to their neighbours. These findings suggest that while perceptions seem well established when aggregated at the national level, interesting incongruities occur at the neighbourhood level.
Taylor et al. (1984) found that physical territorial markers did play a small part in creating feelings of safety and security. He found that fear was related to territorial variables, the better the space was defined, the lower the fear and women had higher fear than the men selected.

Pablant & Baxter (1975) suggested the offender has the same needs for prospect and refuge when stalking a target. This implies the target is a person but it may also apply to property, such as school vandalism. A study by Archea (1985) suggested that robbers felt discomfort depending on whether they could be seen or not.

The research tests ideas upon which broader theories are based. In the field of environmental criminology, there are 3 key theories: Pattern Theory by Brantingham and Brantingham (1984,1981); Rational Choice theory by Cornish and Clarke (1986); and Routine Activity theory by Cohen and Felson (1979). It is interesting that these theories were developed and verified by research over a decade ago and yet there has been no translation to the field of architecture.

2.3.6 Pattern Theory

Brantingham and Brantingham (1981) focus on how crime happens in specific locations and in time. This focuses on the offender and target set in place and time with emphasis on the place of the criminal event. The criminal event can be understood in the context of peoples normal movements through those places in the course of the day, week and year. Normal activities strongly shape crime patterns of both the offender and the victim or target. Pattern theory looks at differing scales from patterns of crime on the city level to the building level. It tends to study crime statistics or the geographic layout of crime occurrences as opposed to the offender’s perspective. If we understand what motivated an offender to get to the criminal event (rational choice), and we see that these decisions fall with the normal activities of street, cities and countries (routine activity) then is crime uniformly placed throughout these places? No, pattern
theory looks at the non-uniform location of crimes. It is based on the following assumptions:

- that there are individuals motivated to commit crime,
- that there is a multi-staged target selection process,
- the selection process is influenced by cues emitted by the environment,
- environmental cues and cue clusters are used and re-used by offenders forming templates,
- templates are relatively fixed and have similar qualities within groups of offenders.

Then patterns of crime can be drawn from these repetitive templates. Looking at the selection process from the perspective of occurrences in space and time, then spatial qualities can be understood again, based on behavior in the environment.

- most crimes are committed close to home or at major activity nodes,
- offenders tend to cluster together,
- crime happens in the action spaces of the offenders.

Based on the above, patterns can be drawn that crime happens on pathways and nodes along those pathways that are used by clusters of offenders where and when suitable targets are available.

2.3.7 Rational Choice Theory

This focuses on offender decision making offers a more fruitful framework within which to consider deterrence than do most existing criminological theories, which seem geared toward rehabilitation and social prevention. Clarke looks more at the distal and proximal risks of offending. Rational choice looks at the offender’s perspective of how they use the environment rather than just looking at what motivated the offender.
2.3.8 Routine Activity Theory

Routine activity theory was based on the work of Shaw and McKay (1929, 1942) who examined the way sociological factors affect community structure that generate illegal acts. It was also based on human ecology (Hawley 1980) because of the interdependence between social activities that were carried out everyday within the community. Specifically, human ecology contributed not just spatial but also the temporal interdependence of these everyday human activities. Routine activity theory made two basic assumptions about the criminal event;

- there had to be a convergence of 3 elements for a successful crime; a motivated offender, a target, and a lack of guardianship, and
- that illegal acts form part of the routine activities of people living and surviving in a city.

Cohen and Felson (1979) looked at large scale crime patterns in the 1950's. They suggested that the shift of women into the work force leaving an empty home and the increase in small electronic appliances lead to increase in break and enter on a large scale. The change in culture is explained to have an effect on increased crime due to the overwhelming availability of easy targets and lack of guardianship thereby decreasing the necessary level of motivation. It is likely that the increased interest in criminology in Britain and United States is due to the sharp increase in crime in the 1950's and 1960's and therefore related to population increase due to the post war baby boom.

2.3.9 Summary on Research in Environmental Criminology

In summary, the field of environmental criminology has developed significant areas of research since the 1970's. This research has been rigorously tested through scientific methods that are upheld in this field. Some of the research considers very detailed environments such as vandalism on telephone kiosks in Britain, while other research contributes to broader theories such as pattern theory, rational choice theory and routine activity theory. When attempting to
apply the research to architecture, it helpful to consider the research findings in orders of importance.

The first order of importance flows from the broader theories. Crime happens on pathways or at activity nodes where there is a presence of “high-risk” populations. Over the broad spectrum of different types of crime, a high-risk population is most often young males in their teens and twenties (Clarke 1978, Light, Nee and Ingham 1993, Wright and Decker 1994). These high-risk populations tend to undertake routine activities (Cohen and Felson 1979), going from one activity node to another along established pathways, whether pedestrian, vehicular or other (Brantingham and Brantingham 1981). The presence of a high-risk population on a pathway or at an activity node, such as a convenience store or liquor establishment, will be the first order of importance for whether a crime or nuisance behaviour will occur. For example, the choice of what area of a city to undertake a burglary is influenced by where the burglar lives and the routes between daily activities such as work, family commitments and entertainment (Wright and Decker 1994).

The second order of importance is the environmental circumstances in which those high-risk populations find themselves, as they move along pathways, from one activity node to another. This is where defensibility, surveillance, target hardening, access control and building design can have an impact. For example, whether a burglar chooses a specific house on a street depends on environmental cues such as areas of concealment and lack of surveillance from a neighbour (Cromwell 1991).

A third order of importance involves more passive environmental circumstances such as lighting, weather and landscaping. If these environmental circumstances are used along with the more important determiners of crime, then they may assist in reducing crime. For example, Poyner (1992) initially improved lighting and lowered hedging in a parking lot in Britain. This had minimal impact on reducing crime. It was the introduction of formal surveillance by monitored CCTV and security personnel that a reduction of crime occurred.
Thus far, knowledge of the broader theories of environmental criminology, the first order of determiners of crime in the environment, and many of the detailed research on environmental circumstances, the second order, are not known by architects. When designing, an architect may attempt to design something that will reduce crime but will do so in the absence of the recent scientific inquiry that has developed in environmental criminology. This has been shown to be partly because of the resistance to scientific inquiry at this point in architectural history. Further chapters will illustrate that part of the resistance is embedded in the design process itself. The next chapter considers the attempt to apply the social sciences to architecture that occurred during the 1960's. This serves as a model of how environmental criminology can avoid the failures and utilize the successes experienced by these sciences.

CHAPTER III The Social Sciences and Architecture

3.1 Developments in the Social Sciences and Architecture

The social sciences, as the study of people, started in the Renaissance, as the ideal of the humanist, to the shift during the Enlightenment where the human condition could be scientifically resolved and all the ills of humankind could be solved through scientific inquiry. The study of humankind still continues and in the 1960's it turned to the role of the environment. The basic social sciences; sociology, anthropology and psychology, began to branch into sub-areas that focused on the physical environment. Sociology began to consider the physical environment as a component of group processes. Anthropology was concerned with the artifacts of culture and the settings in which they were created, but the focus of attention remained on primitive societies thereby having limited application to the trend in environmental research. Psychology began to consider the effects of the environment on individual behaviour and perception.
Off shoots of each of sociology, anthropology and most notably psychology became applicable to architecture. The focus on how the environment is perceived by people developed as cognitive mapping (Lynch 1960) and personal space (Sommer 1969). The study of what the environment means to people was developed as communication through semiotics, sign and symbolism (Eco 1968, Broadbent Bunt & Jencks 1980). The study of the group related to the environment developed later in sociology as urban sociology and ethnography (Whyte 1980, McNamara 1995, Taylor 1996). Understanding of syntactic structures of the environment developed from the study of linguistics (Chomsky 1957, Hillier 1996) and the study of architecture as a cultural statement developed in anthropology (Rappoport 1969, Levi-Strauss 1963).

The development of the field of environmental psychology is the best example for comparison to environmental criminology because it had the most applicability to architecture. Environmental psychology was concerned with the interrelationship between people and the environment. It had a brave new mandate (Canter 1969) to fix the ills of architectural design, to fill the gap that was left from the pure functionalism of the modern movement where the people, the users of the building, were given lower importance than expressing the modernist manifesto of pure form. Psychology branched into environmental psychology or architectural psychology and was well developed by the 1970's. There was research that focused on people in specific environments such as inside buildings, outside buildings, crowding and privacy (Canter 1974, Proshansky, Ittelson and Rivlin 1980). However, the large quantities of data collected and subjected to minute analysis rarely had any applicability to design. In many ways, this is exactly the case with environmental criminology. Isolated studies in crime rarely have direct application to architecture. It is only by summarizing bodies of research, then identifying a basic truth that relates to design, will there be applicability to architecture.

Perhaps best summarized by Appleyard (1973), the environmental psychologists of the 1970's were “impressed by the inertia of (architectural) professional thinking” (Ibid. p. 88). Further, they felt that environmental professionals did not appreciate empirical research, they saw it as
a threat, they did not read research journals, nor did they understand research. Appleyard suggests social science methods could be used during the programming phase of a project as a situational approach. “Such research might include interviews, questionnaires, behaviour observation and environmental measurement” (Ibid. p. 88).

Yet there was an understanding that there was more to architecture than research and programming. More than Canter, both Appleyard and Lynch seemed to accept that the study of people and the environment was more than just empirical research and scientific findings. They tried to capture both the tangible and intangible, perhaps trying to find a balance between of pure scientific inquiry and pure creativity. Appleyard promoted designing for people, all the people. Lynch (1960) developed the idea of cognitive maps, the legibility of the city and the basic components of pathways, edges, districts, nodes, and landmarks. These ideas formed basic truths that continue to carry meaning for many people. They are still used in planning and design of the environment. It appears that the concepts developed by scientific research must develop into well-rounded concepts that help people understand some basic truth of the way we think and see. Perhaps initially, it is important that the concept has a strong scientific base of research but this must be broadened to see if it is an important or whether it remains a particular of inapplicable information. Then, even if it does become a basic truth, it may or may not have validity in the design process.

Robert Sommer’s article *Looking Back on Personal Space* gives a good retrospective of the applicability to architecture.

When I did this research (on personal space), I believed that it would be of some use to architects. Since architects were concerned with designing spaces and this research was concerned with space, there *must* be something useful in it for architects. Looking back I think this assumption was, if not unwarranted, at least over optimistic. I do not believe that the person-space bubble is a logical unit in architectural design. It may be an interesting and useful concept for architects to have around for conceptualizing interaction spaces, but I would not like to see buildings designed with personal space used a some kind of a standard or unit of measurement. Besides, it soon became apparent that the important questions at the interface between design and behaviour dealt with issues and concepts
more complex that interaction distance. (Sommer 1974, p. 207).

Sommer’s social psychological research helped to define privacy for use by architects. Privacy was translated into programmatic needs of people then used these in relational (bubble) diagrams at the early design stages. Although considerations of privacy were already integral to architectural design, it was further articulated and advanced by scientific inquiry. However, in this case, it was given more importance in the architectural design process than it deserved.

Venturi, Scott Brown and Izenour (1972) used research in the science of semiology. They externalized sign and symbol and purposefully manipulated them as an architectural statement. For example, in the design of his mother’s house, Venturi was very aware of sign, symbol and meaning as the architectural statement. Could this have been done without knowledge of current thinking in the science of semiotics? Even if it was designed with the research, what is the architectural significance? There appear to be few basic truths so far in the development of semiotics that have survived in design.

The work of Bill Hillier (1996) and the theory of space syntax has applicability to the discussion of the social sciences. Space syntax develops the qualities of urban space, more specifically, the qualities of the space between the buildings. This is done in immense complexity, only achieved through the use of computer technology. Axial maps are developed that analyze the longest and fewest sightlines, lines of movement, the number and type of dwellings along these spaces. In some cases, these calculations have been tested against the actual crime statistics (Hillier and Shu 1998) showing some relation between space and crime and emphasizing the need for more study. Probably the most interesting part of Hillier’s space syntax theory is the use of powerful information processing computers to analyze a non-traditional way of perceiving the environment. Space syntax could have applicability to environmental criminology in future because it analyses the movements of people through space in greater detail that previously possible. This supports the importance of the theory of pathways in crime occurrences. In the mean time, this area of study also struggles for
applicability to everyday architectural design.

Eisenman is playful with cultural statements and shifting frameworks similar to Venturi, “the theme (of the collaboration between Derrida and Eisenman) was to destabilize platonic thought as it persists in architecture” (Whiteman, Kipnis and Burdett, 1992, p. 162). If these social sciences are so outwardly articulated as the message of the building, does it make great architecture or just a passing stage? Going back to the design of the city, if a neighbourhood is purposefully designed to be more imageable (Lynch 1960, Hillier 1996), will people be happier and live better lives? The research is so distant from the day-to-day practicality of living that it is difficult to evaluate the useful impacts.

From another perspective, can a great building be designed if the architect has no knowledge of scientific research in the social sciences? As an example, would Aldo Rossi relate to the recent developments in the social sciences and environmental criminology when he creates a powerful architectural statement?

One feels that a great thing has happened, that Rossi has opened a white window into sight. He has been able to divest himself of ideology almost entirely. Consequently there is no predetermined connection between things, no hierarchy. Everything is seen afresh, may be connected with other things in some new way. This is Rossi’s greatest strength; it enables his eyes to focus upon the nonrational life of objects that may be said to go on inside the brain of man but is not identical with his reason. (Postscript by V. Scully from Rossi, 1981)

Therefore, the social sciences have articulated and developed our knowledge of the individual, the group and humankind. In many ways, these are things that we already know. But if they are not researched, if they have no scientifically established base, they risk being wrong. The value of the scientific inquiry is to develop accurate knowledge of the subject. Even folklore is based on tried and tested methods to a certain extent but folklore is notorious for being wrong about some aspects of the subject.

Environmental criminology is directly comparable to the progress of the social sciences. For
example, in the case of fear in the environment, everyone feels fear at some point for a variety of reasons. If we did not research this, we would be in error of some of the situations where fear levels did not relate to actual risk such as residential parking garages. In cases where there are low fear levels people may be drawn into higher risk environments such as at some mass transit stations. But even when we have researched fear, it is not a determining principle in the architectural design.

Eisenman played with fear at the Wexner Center for the Visual Arts in Columbus, Ohio by creating a building that would have fearful spaces, perhaps knowing that risk of crime on university campuses is low compared to most city streets, especially in the adjacent streets in Columbus. Yet the Wexner Center has an architectural intention that goes well beyond the playful use of feelings of fear. Through the use of juxtaposed grids, references to armory/tower building forms, steel frames that conjure images of unfinished scaffolding, rooms for the performance of visual arts in both indoor and outdoor space, Eisenman expresses the determinism yet hopelessness that could be said to represent the neo-modern condition.

One of the great virtues of Eisenman, as of Le Corbusier before him, is his indefatigable attempt to symbolize the dominant views of science and the human condition without recourse to consoling philosophies that are wishful thinking, or accommodating half-truths. Eisenman announces, with Foucault and others, the end of humanism, the centered subject, the integrated personality, the unified city and harmonious architecture. In short he was invented to give Prince Charles a sleepless night. His architecture attempts to be the built metaphysics of the Modern *episteme*, redefined by Post-Structuralists in its more radical, or ‘Neo’ form. (Critical essay by Charles Jencks from Papadakis, 1989, p.35)

Nan Ellin suggests that fear in architecture is a result of cultural changes over time.

The deconstructivist trend in architecture, so critical of the escapist tendency of postmodern urban design, has attempted to express the messiness of the contemporary world. But deconstructivism’s lack of a social agenda, its extreme cynicism, as well as its consequent coziness with elite benefactors have conspired to produce the ultimate architecture of fear, places that are not assuring, conducive to contemplation, or nurturant. It is not surprising that despite the media attention devoted to deconstructivism, its actual impact on the landscape and the urban design profession is negligible. Rather, it seems
more of a passing fancy of some designers dissatisfied with the bulk of what is being
produced and seeking alternatives, commissions, and notoriety. (Ellin 1997, p. 40)

3.2 A Model for Environmental Criminology

The research in the social sciences including environmental criminology is partially complete.
It illuminates some of the questions of how and why crime happens but it is raw information
that has not been summarized into a useable format for architects. As a result, this information
is relatively unknown and the architectural approach to designing safer places tends to go back
into the memory of the individual designer to utilize any knowledge that is available on crime
or fear of crime. Most people have a natural understanding of fear and in the absence of
knowledge of crime, safer designs have tended to depend on feelings of fear. Feelings of fear
are often counterintuitive to actual risk of crime. This thesis suggests that it is important to
separate and validate the important feelings of fear while also considering the actual risk of
crime.

In my tiny California grade school, its asphalt playground ringing loudly from the
neighboring freeway, there were two distinct types of kids. We were desegregated, yes, but
separate and unequal... there were those who lived on the other side of the Tunnel, the
Tunnel that provided daily access from the other side of the freeway... It was not that
we feared the Tunnel kids...; we feared their beyondworld, their known that was our
unknown, their forbidden “mean streets.” And, most of all, we feared the dark passage, the
Tunnel itself...

My tiny grade school is closed now, boarded up. Through chain link, the Tunnel’s maw is
“tagged” and smells of piss — I still will not go there, not for a can of Coke or anything.
Having become a woman, having internalized a somewhat normative femininity, I fear it
now more than ever. I fear rape. I fear assault and robbery. I fear bodily harm — from the
rough grabbing of my wrist to the gunshot wound to my head. I fear mental and emotional
harm — from the racial epithet to the trauma of bodily victimization. I fear violation — of
my materiality, of my un/conscious, of my self. The Tunnel implodes my terrors. (Abject
Terror by Dora Epstein from Ellin, 1997, p. 133-4.)

This section suggests that scientific inquiry is invaluable to clarify and develop our thinking on
the human aspects of the environment. It is the application of the research in the social
sciences as well as criminology to the field of architecture that has, so far, been naive. It has been applied as a determiner of form rather than, as it should be applied, as a background ordering principle thereby allowing architecture to achieve a balance with the artistic.

CHAPTER IV: Practical Considerations for Applying Environmental Criminology

Environmental psychology has followed a similar developmental time line as the other social sciences. It branched off in the 1970's to consider the role of the environment in the criminal act. Environmental criminology has developed slightly later and is made up of a tremendous amount of empirical research, probably more so than environmental psychology.

Newman (1972) developed design principles for applying criminology to architecture, which developed into Crime Prevention Through Environmental Design, (CPTED, pronounced separated). This was made up of generalized design principles; surveillance, territoriality, defensibility, eyes on the street. Surveillance can be “natural” where one is able to observe the public areas of one’s neighbourhood and “formal” where a person such as a security guard is employed to watch an area. Territoriality is the tendency to claim an area as one’s own and to exert influence over this area both through maintenance of physical markers and the laws of behaviour. Defensibility is the use of markers that discourage opportunities for crime such as a fence that defines a front yard. Eyes on the street stemmed from Jane Jacobs as a holistic interaction of residents and workers in a neighbourhood that engaged in street activity and therefore made the street safer.

CPTED developed out of Newman’s work but in general, it has not been successful in its application to the environment nor to architecture. Similar questions can be asked of CPTED that were asked of the other social sciences. Take the idea of territoriality defined by Newman. If we design territory in a townhouse project, besides asking if it will be better liked by people, will it reduce crime? Studies show that clear definition of space is imageable (Lynch 1960) and
that some people will tend to claim it more (Wilson in Clarke 1978). Is it really believable that
if a townhouse was designed with this in mind that it would have less crime? Many architects
sense that these generalized design attributes such as putting up a fence, pruning the bushes
and increasing the lighting would not be enough to discourage a break and enter into a
townhouse and that there must be something more to the story. Research in the field of
environmental criminology has confirmed that there are other more important reasons for why
crime will happen such as presence of high-risk groups and pathways (Brantingham and

To look at it another way, research in environmental criminology shows that areas of
concealment (hiding places) are most often associated with increased break and enter into
ground level residents (Hope 1984). If we create areas of concealment in front of a patio
sliding door in a townhouse, will break and enter occur more often than the building right next
to it or to a building in another neighbourhood? The likelihood of that house experiencing
more break and enter has more to do with what high-risk group is passing by that particular
place than it does if there is an easy hiding place outside the sliding door. This is the current
state of attempting to reduce opportunities for crime in architectural design and on that basis,
much of the CPTED approach has been discredited by architects who consider that there is
more to creating a safe environment than “bushes and lights”.

The other main concern with CPTED is the valuation of crime. By using words like
surveillance, defensible and territorial, it suggests that designs that prevent crime must be at
war with the environment. Many of Newman’s design solutions promote gating one group off
from another. This is a police-state mentality that implies that the criminal is a bad person from
outside the neighbourhood. Architects have concerns that gating off one part of a city has
negative impacts on the city as a whole. As Jacobs suggests, it creates turf that naturally pits
the interests of one group against another. The eventual play out of this approach results in the
city as a fortress not as a sustainable organism (Davis 1990).
At this time, environmental criminology is able to offer important information that will change the way people see the environment in terms of crime. In even broader terms, it will change the way they see other people and places perhaps similar to Sommer's development of personal space. Yet the development of personal space remains only one design principle in the myriad of design principles. For environmental criminology, the idea of pathways will likely be the next important principle or basic truth. Yet, even if it does become fully understood, its application to architecture will be as a background ordering principle that is incorporated into the already complex design process.

Therefore, the most important way to apply environmental criminology is to promote information about crime prior to values being placed on the information. People will make their own valuation of where this information fits in and how important it is. For architects, the design process will select and utilize that information as required, on the way to creating the form. At this point, it is necessary to consider the architectural design process.

CHAPTER V Developments in the Architectural Design Process: An Approach

In the time of the Beaux Arts, the process of design that went on in the heads of the architect was the black box, a mystery not to be studied or discussed. Early in the 1900's, the modernists, particularly Le Corbusier (1923), considered that human effort could be drawn as a number of basic standards and one simply had to deduce an arrangement of these standards for any particular design. The design process was articulated to follow the modernist manifesto. In the 1960's, more in reaction to the modernist approach (Eastman 1970), there was burst of research in the social sciences as they related to the environment. Study of the design process was part of this rush and a detailed attempt was made to make the black box a glass box (Jones 1970) with the work of the design methodologists.
This group was not just considering architectural design but started with general design, decision theory and artificial intelligence. They were motivated by the idea that scientific inquiry would solve a myriad of problems, soon all the mysteries would be solved through logical analysis and testing.

Not only was the possibility of a "scientific" and totally objective approach toward design seriously entertained, it became a goal in itself. A confident sense of rational determinism prevailed; the whole process of design, it was believed, could be clearly and explicitly stated, relevant data gathered, parameters established, and an ideal artifact produced. (Rowe 1987, p. 110)

Important contributions were made to design process and decision making but it was clear that the mysteries were far more complex and research that was being done was limited. The mechanized design process often increased time with a less desirable solution and only very simple designs could be handled by artificial methods.

Most importantly, the methods failed to incorporate the intangible, artistic side of architectural design. It was Alexander (1965) that recognized this deficiency and eventually broke with the group, although Alexander’s early work, with his mathematical background was still
mechanistic. Hillier and Leaman's (1974) earlier work also included intangibles in his theory of design method.

Nevertheless, some important features of the design process were discovered that can shed light on environmental criminology. The step by step process of design was considered and diagrams that designers go through as part of design were produced. Early discussion characterized the process as conception, realization, communication or as analysis, synthesis, evaluation (Jones & Thornley eds. 1963).

Fig. 4. Diagram from Design in Architecture by G. Broadbent - analysis, synthesis, evaluation model.
A slightly different map was developed by Darke (1979) as generate, conjecture, analysis. All through the development of thinking on the design process was the idea of cycling back through testing and retesting. The difference is that one theory put the generation of the design concept first as the primary generator. In other words, the designer has to see the whole before designing the parts. This is more popular in recent research in design methods. But it is difficult to say which is first, for example, if the subject is very complex, such as a hospital, then some knowledge of how the program will work gives input into the first concept. If an architect generates a concept first then it assumes they already have some knowledge of the subject.

Either way, generating an idea or gathering data, the process depends on knowledge that the architect has gathered over time as an observer of the environment. Knowledge is one type of life experience and life experience is all the stuff that people are made of, gathered throughout life. People gather experiences so they can survive in the world. They take in a lot of information or scattered particulars of all sorts. They make a valuation of those bits of raw information, either fit it into our way of seeing the world and store it for use at other times. The information can also be discarded if it cannot be substantiated or somehow connected to other knowledge frameworks. The decision to keep certain information depends on the individual’s way of seeing the world and this is partly comprised of a genetic framework that each person is born with as well as life experience. Both the genetic framework and the life experience of the designer will influence what information will be retained and what will bond with that which is already stored to make the individualized worldview. Worldview is described as the construct of the individual that incorporates time, place and the state of humankind and somehow with the folding of these components, worldview becomes creative, intuitive and artistic. The primary generators of design come from the individual’s worldview.

Architects have a specialized focus on places and people (environment and behaviour). They gather all types of information (feeling, facts, colour, smell), they find a place for it in their
finely constructed view of the world and store it for use at other times such as use on a design problem. The storage of information is an interesting subject. Architects are problem solvers. However, many of the design problems in architecture cannot be solved by known information, they are ill-defined problems (Simon 1973) or wicked problems (Rittel 1971). To make the leap to a solution with missing information, architects create prestructures (Hillier and Leaman 1974) or form making as the action of a series of subsystems (Alexander 1964). Chan (1997) suggests that information stored in memory must form a relationship with other knowledge thus forming relational chunks that can be partially or completely retrieved.

The scattered particulars that make up all the information in the world can be gathered together by the individual and stored in memory by creating inter-relationships with other information. The information is evaluated and tested before it is stored. Therefore, information that can not find a relationship to other accepted knowledge will be unlikely to influence the thinking of the individual. As suggested “without prestructures of a fairly complex order, it is not possible to identify the existence of a problem let alone solve it.” (Hillier and Leaman 1974). These are relational frameworks of knowledge that have been developed and tested by the individual about various schemas of places and people or environment and behaviour. Akin (1982) describes this as representational knowledge, a hierarchical network of symbols. They can also be described as complex into the realm of intuitive or creative which comprehend elements of chaos.

Chan (1997) looked specifically at how architects create these frameworks and integrate knowledge. To be placed in memory, we seek out relations with other knowledge. Information is tested and sorted before it is accepted (Korobkin 1976, Zeisel 1981). Then, once it has passed testing and sorting, it finds a place in a well constructed framework, in a richly connective universe that is the individuals world view. Once this knowledge becomes part of worldview, retrieval of the knowledge becomes autonomic.
Fig 5. Spiral metaphor diagram from *Inquiry by Design* by John Ziesel.

Image is one way that is used to retrieve the relational frameworks that are stored (Cuff and Robertson 1982). Image is used by architects and appears to have a creative side to it, whereas information is factual. Therefore, at some point, the information takes its place in the individual’s framework and becomes creative, whether it is at the point of storage as an image or when it is recalled for a specific task.

Mental images are possible within any mode: visual, olfactory, tactile, aural, and taste – any sensate experience that is impressed as memory, stored, and manipulated within the inner workings of the mind. Each designer uses a personal history of places and events, or combinations thereof, directly or vicariously experienced, as a basis for understanding the semblance of a future place. (Downing 1992, p. 65)
To create a design, images are drawn upon. The idea of imaging, testing and streams of consciousness (Foz 1972) can provide a model. Solving a design problem is cyclic; generate, conjecture, analysis. (Darke 1979, Lawson 1980, Chan 1997).

Fig. 6. Individual thought streams.

Korobkin (1976) suggests that designers use 2 types of information in the design process; image information and testing information. Zeisel summarizes;

Designers use "image information" heuristically as an empirical source for basic cognitive design decisions. . . . Image information conveys a feeling or a mood of some environment. It cannot be used to evaluate isolated specifics of a design concept. Test information drawn from the same body of knowledge is useful to evaluate specific design alternatives. (Zeisel 1981)

The importance of this information gathering to the field of environmental criminology is partly as discussed previously, that if there is no knowledge of crime or the principles of environmental criminology then it will not be included in the design. But of more importance
is the suggestion that bits of information, the scattered particulars that each person is bombarded by every day, will be rigorously tested against knowledge that each person already has. It appears that it will only be accepted into memory if it can create a relational image with other accepted knowledge.

For example, Newman studied crime and consolidated his ideas into a basic truth such as defensible space. Defensible space made sense because it connected with parts of the experience and knowledge that architects already had. But there was not enough information and the testing that architects put Newman’s ideas through fell apart on some levels. For example, detail was not given on when it was right to have open visibility and when it was best to close off visibility.

The detailed research of the social sciences will eventually answer some of the questions. For example, if it was said that graffiti was primarily taken on by young people and was common along pathways and at activity nodes. Then if a real example were shown such as Emily Carr School of Art in Vancouver with graffiti pathways emanating from those used by some of the students, this would begin to show the real life patterns that should also be believable. Even then, many people consider graffiti to be an art form and often condone this as a creative expression. It is the perception that this activity is not crime or a problem that also diminishes the understanding of the possible solutions. A valuation of what is a crime and what is not, has already been made.

Therefore even if the crime information is supported by real life examples, certain associations will not be made because the individual has developed values about societal definitions of crime. This thesis suggests that there is yet another important level that must be understood before crime will be adopted into the way people see the environment. A framework for understanding must be developed before much of what environmental criminology has to offer will be adopted.
For an example, research in environmental criminology shows that males are the aggressors of our society and much of the crime (as well as the achievements of society) are related to this single fact. This is very difficult to accept and is most often disregarded as sexist or discriminatory. In another example, to tell someone that has had their home broken into that burglary is just as much a routine activity for some people as shopping for groceries is for another person is difficult to accept. This is because there is no framework for understanding and these root principles of environmental criminology often cause anger and rejection. So much of crime knowledge is not common knowledge and therefore can not be integrated with an individual’s worldview. It remains bits of unconcluded information, floating out there, value laden with fear and anger. There is no relational framework to allow this information to bond with worldview. The story of environmental criminology must be presented within a framework so that the bits of information can actually be accepted. Some initial elements of the framework are developed in the following chapter.

CHAPTER VI   Developing a Framework of Understanding for Environmental Criminology

Much of the discussion of crime is morbid and people have no background knowledge to find a place to put the information. They do not know how infrequently the different types of crime happen and they do not know what kinds of circumstances they have to be in to increase chances of this happening. Therefore there is a general fear reaction. The first framework to develop is to reduce the fear associated with the discussion of crime; “F1. crime is a rare event”. The type of crime that people fear most is random violent aggression.

This could be characterized by a situation where a woman would be walking home late at night and is afraid that someone is following her with the intention of a violent assault. In fact, a violent crime of this nature is exceptionally rare, particularly in Canada where violent crime is low. In Vancouver, it is much more likely to have a car broken into than to experience any type of violence yet even the risks of having a car broken into are comparatively infrequent. It would also be helpful for people to know that if someone has broken into cars in their
underground parking that these thieves would not likely escalate to violent crime because the motivation for the two types of crime are very different (Cornish & Clarke 1986). Although it is not within the scope of this thesis, further discussion on this frame would have crime statistics that would illustrate the rarity of all types of crime. Even the most common type of crime; car crime, is rare compared to other activities like driving, taking the bus, walking or shopping.

When commencing a discussion on crime, the initial focus where awareness is raised makes it seem that many people are involved. Yet few people actually take part in crime, thus the second framework should be introduced; “F2. Few people take part in crime”.

Knowing that so few people take part in crime, one begins to wonder who it is then. Next comes the “who” of crime; “F3. The criminal, “they” are us”. This frame stems from routine activity (Cohen & Felson 1979) and rational choice theory (Cornish & Clarke 1986) where the choice of the individual to undertake crime is not random and the criminal activity happens as part of a normal daily routine. The routine of the criminal looks similar, in many ways, to that of individuals that do not take part in crime. Newman (1972) has been accused of seeing the criminal as an outsider, as someone bad. This is a personal value system that has been applied to the criminal. It is for each individual to evaluate what the impacts of different types of crime are, good, bad or otherwise. Examples of this type of discussion relate to prostitution and illegal drug addiction. There are many proponents that advocate legalization of prostitution and drugs and many that do not. The point of this frame is that designers will not develop an accurate “crime picture” of the environment if the criminal is perceived as someone different and unlike ourselves. Nor will the picture be accurate if the criminal is faceless, perceived as anyone. Research shows that the characteristics of a group that is likely to undertake a certain type of crime can generally be clearly identified. Once identified, then the perception of crime in the environment changes.
Ziesel (1981) describes an example of the study of environment-behaviour as a shopper;

“To a shopper, for example, a supermarket environment comprises aisles, shopping carts, and check-out counter; administrative rules, regulations, and prices; and other people — how friendly they are, how well they know one another, how they act...thinking, feeling seeing...” (Zeisel 1981)

If shopping can be described in such ordinary terms then there is no reason why a person who chose to undertake break and enter can not also be described this way. From an environment-behaviour perspective, it is all part of the same set. Admittedly it does not carry the same values whether to go out and go shopping for legal or illegal goods.

The second part of the “who” of crime is the next inevitable question. If there are so few of these people and the choice to take part in crime happens for specific reasons as part of a daily routine, then what are the characteristics of those people that do take part in crime? “F4. Of those people that do take part in crime, they carry similar characteristics (high-risk populations).” This is the most difficult frame to resolve. To generalize and identify types of people that are more prone to take part in crime reeks of discrimination. In every group that has been identified as a high-risk population, there are those that fit the characteristics yet have no involvement in crime. Generalizations, by their nature represent the majority, not the minority. However, at present, there is not another model for identifying the “who” of crime so generalizations are used. According to the research of the offender, it is clear that high-risk populations for most crimes can be characterized as young males in their teens and 20's, although this varies slightly depending on the crime. For example, in Vancouver, there are 2 primary high-risk populations; male youth and drug addicted young adult males. These generalizations are far from resolved, never the less, generalizations must be made to further the understanding of crime in the environment, and for architects to take part in the dialogue.

At this point, the whole discussion of crime is often rejected. There are so many unresolved issues that it is difficult to go on in the discussion. “F5. Who decides what is crime and how it is to be dealt with?” It relates to an individual’s philosophy of life. Should a female, low
track, street prostitute be loathed or pitied? Should prostitution of all kinds be legalized? Should society worry about some kids doing graffiti when other kids are robbing and beating other kids to death? Should all those people just be thrown in jail? Should jails punish or rehabilitate? If not jail then should the local community court administrate certain types of crime? Is addiction to illegal drugs a crime or a civil right? Should we just move the homeless to new locations or can we afford special housing? If housing is made available, will homelessness become a lifestyle choice?

This thesis will not resolve these questions, rather it points out that the designer needs a framework of understanding before information on the subject will be considered. This is because design is a comprehensive process, involving all the things that a designer thinks. If a designer believes that graffiti should be encouraged because it is artistic then there is no need to inquire about who undertakes this activity and why. Every bit of information that goes toward reducing opportunities for graffiti will be rejected. "F6. The individual must develop a personal valuation of how crime fits into their worldview based on factual examples and personal experience." The information on the subject must be presented in a believable way through real examples and factual data. Once the framework is resolved, then there are some useful principles of environmental criminology that will assist design.

CHAPTER VII   Design Principles of Environment Criminology

The first and most important of the principles of environmental criminology is the concept of pathways, activity nodes and high-risk populations. "EC1. Crime happens on pathways and at activity nodes where there is a presence of high-risk populations." It has taken a long time to research and establish this basic truth. The idea of pathways and nodes is not new to architecture, it was developed by Lynch (1960) and draws on research from the other social sciences.
For those that choose to undertake a crime, they do so as part of their everyday routine activities and within their awareness spaces. “EC2. Crime happens within the awareness spaces of the potential offender.” Crime is not uniformly placed over the environment, there is always a reason why it happens in one place more than another. For example, a thief will rarely travel a long way out of their way, into unknown territory to search for something to steal (a target). Rather, they will search on more familiar ground such as on the way to and from home.

To understand the way crime happens in the environment, it is helpful to see that there are 3 components to a successful crime. “EC3. The criminal event requires; a motivated offender, a target and a lack of guardianship.” For example, in Vancouver, there are generally high crime levels in the Downtown Eastside neighbourhood. Yet directly adjacent to that area are railway tracks. There is very little crime happening in this area which is vacant and therefore has nothing to steal. The area is fenced so there are no offenders present or any pathways through the area. Admittedly, there is a lack of guardianship (no one watching), but that does not have an impact because 2 of the 3 components are missing to establish a possible crime. If there were rail cars being stored on the sidings in this area there would be a target for graffiti or theft. If there was a natural pathway through the site by youth, then the likelihood of the rail cars being tagged with graffiti would be extremely high. In other words, in the latter example, all 3 of the components exist.

If enough is known about the way crime happens and the environment, then predicting the crime on a site is relatively easy. For example, traffic engineering involves design of safer roads for pedestrians and vehicles. There is a tremendous amount of research on how and why car accidents happen. Based on that, traffic engineers predict the actual number and location of possible accidents where a road shows traits of unsafe design. This is comparable to environmental criminology. Although there is still much research needed on various types of crime, it is already possible to begin to predict the type of crime that will happen on a given site. “EC4. Most crime is predictable, typical and repetitive.”
8.1 An Example - Oakhurst

This example shows the importance of knowledge of environmental criminology as part of the design process. The site used for this example is located south of the central downtown area of Vancouver. It is not in the high drug use area. Teenagers would be considered the high-risk population in the area and as such, the types of crime to expect would be vandalism and graffiti, minor theft such as bicycles, theft from cars and possibly residential break and enter.

Fig. 7. Location Plan
The western edge of the site adjoins a main arterial road. These types of roads generally show higher crime levels than surrounding residential scale roads (Beavon, Brantingham and Brantingham 1994). Design for reducing opportunities for crime should therefore focus on vandalism, minor theft and residential break and enter.

Fig. 8. Site Plan

This site is surrounded by a higher income, single family residential neighbourhood with a high school (grades 7 through 12) located to the northeast and a community centre located directly to the south. Interviews with community centre staff and site observations confirmed that the site has been used regularly as a cut through by neighbours, staff and students.
The site is proposed to be redeveloped with apartments and townhouses. The community and neighbours requested that the cut through and associated open space be maintained as a public walkway through the site.

Given that the cut through was a well used pathway and that teenagers were expected to use it, then it is reasonable to assume that crime would be most likely to occur there. The pathway that carries a high-risk population (teenagers) will be the primary design challenge of the site, with the main arterial pathway being a secondary challenge.

The proposed design used private roads below grade level for vehicle access to the parking for the apartments and townhouses. These private roads dead end into the walkway, at the lower level, leaving an abrupt end condition.
There were concerns raised with this design that the dead end roads might be unsafe if a person were being chased and had no way to get out of the lower roads. This response illustrates that people’s natural response to anticipating the type of crime that will happen tends to be based on fear in the absence of knowledge of crime. In response to these fears and perhaps to the unpleasant space created by these dead end road conditions, the design was changed to add stairways at the end of each road that would lead up to the public walkway.
Analysis of the neighbourhood demographics, the existing and proposed uses and the current crime patterns suggested that the most likely types of crime would be mischief, vandalism, minor theft and break and enter. In terms of violent crime, given the types of teenagers, any type of violent crime is very unlikely to occur. However, we also know that staff from the community centre and neighbours from the area will use the walkway day and night so it will put potentially vulnerable population onto that walkway, even though there would be an absence of motivated offenders. Therefore, the design should encourage watching and ownership of the walkway even in the unlikelyhood that a violent crime will occur. This design will also reduce opportunities for other types of crime.

Putting the stairs from the walkway down to the private road is an error because it would
encourage the high-risk population to circulate past the car garages where there is an availability of things to steal such as cars, bikes, skis, snowboards and tools. This would also increase the likelihood of graffiti, vandalism and theft. The site has become "permeable", allowing high-risk populations to circulate freely in the more vulnerable areas of the development where there are more items to steal and where there are more surfaces for graffiti.

There are a number of effective design solutions that would reduce opportunities for crime. This thesis suggests that if each designer carries knowledge of the principles of environmental criminology, that if a situational crime analysis is undertaken and if the designer continues to develop a framework for understanding crime with a crime picture of the environment, then the design solutions will automatically take crime into consideration. Therefore, the emphasis of this thesis is not on design solution rather on background knowledge and the solutions offered here are only one designers response.

The design of the buildings adjacent to the walkway will be important to encourage a sense of ownership (not territoruality) and encourage those residents easy ways to watch (not surveil) the pathway. The townhouse units should be oriented to face the walkway and landscaping should allow clear views. There should not be too much lighting at night because this may become an attractive place for youth to "hang out" causing noise concerns from residents. The transition from the private roads should be provided in a way that it is a visible amenity to the residents but not visible from the public walkway.

Another crime opportunity will be where the private roads meet the street. At these points, there should be subtle ownership markers such as gateposts and signage. As a back up measure, rough wiring for a possible future electronic gate could be provided in case future crime levels are higher than expected so that cutting through the site from the south is discouraged. The westerly private road will be visible from the main arterial street where there will be a small percentage of people, driving or on public transportation searching for theft opportunities. The gateposts and signage will also give a clear message of ownership and caring to those potential crime opportunities.
The surfaces along the streets and the public walkway should be reviewed for graffiti potential. Blank surfaces of buildings or retaining walls could be softened with landscaping in front of them, the walls kept low with stepped planting.

8.2 Long Term and Short Term - Research and publish real examples of crime types.

Information guidelines of crime types should be developed that emphasize factual data and real example rather than design conclusions. Any chosen design will automatically carry the value system of that designer and will be most often rejected by other designers. The guideline for crime in parking garages is attached in Appendix B. The format begins with factual information and real examples about crime in parking garages then offers design solutions secondarily. Providing information about crime is the long term goal of increasing knowledge about crime and offering a design solves the short term need to illustrate possible solutions.

8.3 Long Term - Introduce crime into common knowledge.

Until the story of how and why crime happens is common knowledge, there will be limited uptake in the field of architecture and this important will continue to be missed. Crime information can be best introduced through media, information technology such as the Internet and through education. Over the long term, this will change the way people see crime. It is likely that fear of crime will be reduced over the long term. See Appendix C - Examples of Media on Urban Crime Patterns

8.4 Long Term - Incorporate a Situational Crime Analysis (The Brantingham Method) into the design process.

This can only be achieved after a certain amount of crime knowledge has been accepted. Then
this method can be tested with architects. An outline is attached in Appendix D - Situational Crime Analysis.

8.5 Long Term - Introduce geographic crime maps for use in pre-design stages.

Geographic crime maps are fast becoming a useful tool for analyzing crime patterns for the policing. These maps could be made available to architects for crime prevention purposes. They form an essential part of the situational crime analysis. Although the maps are graphic and easily understood, some education must be provided on their strengths and weaknesses. An example of a map is provided in Appendix E - Vancouver Police Department Crime Analysis Unit Crime Map

Conclusion

Designing safer places is of interest to architects whose primary motivation is to create the best environment within the parameters of the design problem. This includes an environment that reduces opportunities for unwanted crime and nuisance activity. What architect would choose to design a project that resulted in 680 calls for police service in an 18 month period? Yet this was the case in a residential condominium building in Coquitlam, British Columbia, where a pathway between a shopping mall and a residential neighbourhood inadvertently passed through the site rather than around it. This pathway, illustrated in Appendix B, figure 12, brought youth through the site on a pathway between their homes and a shopping mall where numerous thefts, vandalism and nuisances were reported to the police. In the example of Oakhurst in Vancouver, British Columbia, the introduction of stairways to improve dead end roadways could result in increasing the permeability of the site and therefore would likely have increased the opportunities for nuisance and minor theft (see page 60).

Traditionally, since Oscar Newman’s theories, architects have attempted to create safer places
based on broad principles of defensibility and surveillance, in the absence of detailed research findings. The detailed findings of environmental criminology illuminate the specific environmental circumstances under which these broad principles would prevent crime. As well, even these specific circumstances can be superseded in importance by the presence of crime patterns such as pathways or activity nodes used by populations searching for crime or nuisance opportunities. Architects have little knowledge of this body of research that is first order of importance to the occurrence of crime and nuisance activity.

The body of scientific research in environmental criminology that has been developing in the last 30 years needs to be translated into an architectural language, accompanied by real, believable examples. These examples need to illustrate the reason behind the crime rather than a simplistic, value laden design solutions such as gating and locking. Factual, well developed illustrations will assist the architect to piece together a framework of understanding for both the detailed occurrences of crime as well as the broad patterns of crime in the urban environment. How this information is adopted will depend on the designers and their individual worldview. The impacts of such a framework on the practice of architecture can only be a conjecture at this point. This thesis suggests that pathways, activity nodes and high-risk populations will have an impact on architectural design. This could be similar to Lynch’s (1960) cognitive maps of pathways, edges, districts, nodes and landmarks or similar to Sommer’s (1969) personal space theory. Both of these examples had important impacts on architecture, yet today, they have taken their place as background ordering principles in the design process alongside other numerous considerations that are utilized when solving the complex problems of architectural design. Taking this body of scientific research into consideration will not solve or dominate the whole design problem, but if it is not utilized, architects will continue to solve design problems that are based on incorrect information. This research must find its place in the architectural design process where there is a balance between both artistic and scientific considerations.
References


APPENDIX A

SAFETY AUDIT CHECKLIST
CITIZEN SAFETY AUDIT CHECKLIST

As this is a general checklist, you may wish to complete all or part of this depending upon your needs.

☐ OUTDOORS GENERAL AREA: ____________________________________________________________

☐ INDOORS SPECIFIC LOCATION: ________________________________________________________

DATE: ____________________ DAY: ____________________ TIME: ____________________

REASON FOR AUDITING THE AREA: ______________________________________________________

AUDIT TEAM MEMBERS: ________________________________________________________________

1. General Impressions

Your gut reactions: _________________________________________________________________

_______________________________________________________

What 5 words best describe the place? _____________________________________________

_______________________________________________________

_______________________________________________________

2. Lighting

Impression of lighting:

☐ very poor ☐ poor ☐ satisfactory

☐ good ☐ very good

☐ too dark ☐ too bright

Is the lighting even? ☐ yes ☐ no

How many lights are out? __________

What proportion of lights are out? __________

Are you able to identify a face 25 metres away? ☐ yes ☐ no

Do you know where/whom to call if lights are out, broken, not yet turned on, etc? ☐ yes ☐ no

Outdoors: Is the lighting obscured by trees or bushes? ☐ yes ☐ no

How well does the lighting illuminate pedestrian walkways and sidewalks?

☐ very poorly ☐ poorly ☐ satisfactory

☐ good ☐ very good

☐ too dark ☐ too bright

How clearly does the lighting illuminate directional signs or maps?

☐ very poorly ☐ poorly ☐ satisfactory

☐ good ☐ very good

☐ too dark ☐ too bright

3. Signage

Is there a sign (i.e. room number, building name, street sign) identifying where you are? ☐ yes ☐ no

If no, are there directional signs or maps nearby which can help you identify where you are? ☐ yes ☐ no

Are there signs which show you where to get emergency assistance if needed? ☐ yes ☐ no

Are there signs which direct you to wheelchair access? ☐ yes ☐ no
Do exit doors identify where they exit to? □ yes □ no

Is there information posted describing the hours the building is legitimately open? □ yes □ no

Impression of overall signage:
□ very poor □ poor □ satisfactory
□ good □ very good

What signs should be added:

Are there surveillance cameras? □ yes □ no

If yes, are they located at the best place? □ yes □ no

What happens if the person monitoring the area sees someone being harassed or assaulted?

Other comments?

---

### 4. Sightlines

Can you clearly see what's ahead? □ yes □ no

If not, why not?
Indoors:
□ sharp corners □ walls □ pillars
□ other ___________________________

Outdoors:
□ bushes □ fences □ hill
□ other ___________________________

Are there places someone could be hiding? □ yes □ no

If yes, where?

What would make it easier to see?
□ transparent material like glass
□ angled corners
□ security mirrors
□ trimmed bushes
□ snow cleared
□ vehicles moved
□ other

---

### 5. Isolation – Eye Distance

At the time of your audit, does the area feel isolated? □ yes □ no

How many people are likely to be around?

- In the early morning:
  □ none □ a few □ several □ many

- During the day:
  □ none □ a few □ several □ many

- In the evening:
  □ none □ a few □ several □ many

- Late at night (after 10 pm)
  □ none □ a few □ several □ many

Is it easy to predict when people will be around? □ yes □ no

Is there a monitor or surveillance system? □ yes □ no

Other comments? ____________________

______________________________

______________________________

______________________________

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6. Isolation – Ear Distance

How far away is the nearest person to hear a call for help?

[ ] don’t know

How far away is the nearest emergency service such as an alarm, parking lot attendant, security personnel, building superintendent, crisis telephone?

[ ] don’t know

Can you see a telephone, or a sign directing you to emergency assistance?

[ ] yes  [ ] no

Is the area patrolled by security guards or police?

[ ] yes  [ ] no  [ ] don’t know

If yes, how frequently? ____________________________

Other comments?

7. Movement Predictors

(A predictable or unchangeable route or path)

How easy is it to predict a victim’s movements? (e.g. her route)

[ ] very easy
[ ] somewhat obvious
[ ] no way of knowing

Is there an alternative well-lit and frequently travelled route or path available?

[ ] yes  [ ] no  [ ] don’t know

Can you tell what is at the other end of the path, tunnel or walkway?

[ ] yes  [ ] no

Could someone hide and wait for you?

[ ] yes  [ ] no

Are there corners, alcoves, or bushes where someone could hide and wait for you?

[ ] yes  [ ] no

Other comments?

8. Possible Assault Sites

INDOORS

Are there empty rooms that should be locked to close off possible assault sites?

[ ] yes  [ ] no

Are there small, well-defined areas?

[ ] stairwells
[ ] recessed doorways
[ ] lockers
[ ] unlocked closets
[ ] elevators
[ ] other ____________________________

OUTDOORS

Are there small, confined areas where you would be hidden from view?

[ ] between garbage bins
[ ] unlocked equipment or utility shed
[ ] alley or laneway
[ ] recessed doorway
[ ] construction site
[ ] other ____________________________

Other comments?

9. Escape Routes

How easy would it be for an offender to disappear?

[ ] very easy  [ ] quite easy  [ ] not very easy

Is there more than one exit?

[ ] yes  [ ] no  [ ] don’t know
10. Nearby Land Uses

What is the surrounding land used for?
- stores
- offices
- restaurants
- factories
- residential houses and streets
- busy traffic
- heavily treed/wooded area
- river bank
- parking lots
- don’t know
- other

Can you identify who owns or maintains nearby land? □ yes □ no

Impressions of nearby land use:
- very poor
- poor
- satisfactory
- good
- very good

Other comments?

11. Maintenance

Impressions of maintenance:
- very poor
- poor
- satisfactory
- good
- very good

Is there litter lying around? □ yes □ no

Do you know how long repairs generally take?
- one day
- within one week
- from 1 - 3 weeks
- more than 3 weeks
- don’t know

Do you know to whom maintenance concerns should be reported? □ yes □ no

12. Factors That Make the Place More Human

Does the place feel cared for? □ yes □ no

Does the place feel abandoned? □ yes □ no

Why?

Is there graffiti on walls? □ yes □ no

In your opinion are there racist or sexist slogans/signs/images on the wall? □ yes □ no

Are there signs of vandalism? □ yes □ no

Would other materials, tones, textures or colours improve your sense of safety? □ yes □ no

Are there public washrooms? □ yes □ no

If “yes”, are they in a good location (not isolated and easy for intruders to enter)? □ yes □ no

Other comments:

13. Overall Design

Impressions of overall design:
- very poor
- poor
- satisfactory
- good
- very good
If you weren’t familiar with the place would it be easy to find your way around? □ yes □ no

Does the place “make sense”? □ yes □ no

Is the place too spread out? □ yes □ no

Are there confusing numbers of levels? □ yes □ no

Other comments:

SUMMARY

What improvements would you like to see?

Do you have any specific recommendations?

Can you think of another relevant place that already has the positive features you’re proposing?

Do you have any other concerns?

Please send audit comments and completed reports to:

SAFER CITY TASK FORCE
CITY OF VANCOUVER
3rd Floor, 453 West 12th Avenue
Vancouver, B.C. V5Y 1V4
Telephone (604) 874-7233 Fax (604) 873-7685
APPENDIX B

PREVENTING CRIME IN MULTI-RESIDENTIAL AND MIXED USE PARKING GARAGES
1 Introduction

A change of thinking can take place with the design of underground parking in residential and mixed use buildings. Underground parking is often a place that people use only out of necessity. Yet, this is the main entrance for most residents, a social space at certain times of the day, it is, effectively, a lower lobby. Many people feel personally unsafe in underground parking but studies show that these spaces are safe for people but that there are significant amounts of theft, from cars and of bicycles. The purpose of this guideline is to explore the actual crime that is happening in these facilities with the intent of showing that a number of design features can make them less vulnerable to property theft thereby leaving the designer opportunities to enhance the physical environment. Important design features include site planning, location and treatment of exit stairs, lobby design and perimeter security.
2 Scope

This guideline focuses specifically on underground parking garages for medium and high density apartment buildings. These often include some commercial uses thereby including parking for a mix of users; residents, their visitors and the commercial users. This guideline does not include surface parking lots, street parking nor does it include purely commercial parking garages.

3 Common Questions

3.1 Are multi-residential parking garages safe?

In Appendix A, reported crime in Vancouver in 1997 is reviewed in detail. In summary, it shows that:
- levels of reported violent crime in this type of facility is exceptionally low,
- the type of violence is low level assault such as pushing or threatening, ie not murder or high level assault such as serious beating or rape,
- when violence does occur, most is by people who knew each other,
- all of the reported violence was in garages that were unsecured, without a gate.

Why, then, are people afraid of these spaces?
Perception: People naturally feel safe in places that are open, well cared for, with other people
around. Parking garages are the opposite, they are enclosed, often neglected and isolated which triggers feelings of fear for their personal safety. It is of key importance to separate perceptions that trigger this fear and actual risk of violent crime. Consider parking garages from the offender’s perspective and the cues necessary to undertake a violent crime. These include;
• plenty of easy escape routes (ie. an open street or park),
• lack of caring guardianship (ie. no neighbours watching that will act on a suspicious circumstance or be able to identify the offender later),
• good visibility of a steady flow of potential targets from a point of refuge (ie. close to a transit station).

Although underground parking has a lack of caring guardianship, it lacks easy escape routes because it is enclosed with only exit stairs for escape, clear views of potential targets are often blocked by walls and columns and relatively few people use the facility making the number of potential targets too low. The statistics confirm that these facilities are not used for violent crime opportunities.

Theft in Parking Garages: In Vancouver, there are significant levels of property theft in parking facilities and people associate violation of their property closely with violation of their person. Violent crime is a serious offence, with more stringent sanctions such as more resources for apprehension and more serious court sentencing. Few offenders are willing to undertake this type of crime if their main intention is minor theft.

More people choose minor theft because;
• cars are everywhere and there is usually something easy to steal and pawn in a car ie. sunglasses, coins, stereo,
• it’s usually easy to get into most underground parking where security is outdated,
• there are relatively few people in underground parking so apprehension is unlikely,
• court sentencing is very light for this type of crime.

3.2 Can Parking Garages be Crime Free?
Many people are aware of or have experienced theft in underground parking and consider that these facilities cannot be free of theft. The following example shows 3 apartment buildings in the West End neighbourhood of Vancouver (see location on figure 11). Sites A and B show higher reports of crime in their parking garages. Site C shows no reported crime and an interview with the building manager confirmed the crime report. A well designed, well secured and well managed parking garage can be crime free even in higher crime locations.
Figure 3 - Comparison of Reported Crime in 3 Apartment Buildings in the West End.
4  Crime Prevention Designs

From the perspective of crime, think of the underground parking as a storage vault for a costly possession; the car and its contents. It can be a place where people can be confident about the space because it is secure with no one there that shouldn’t be and a place where residents can have a positive sense of arrival. Because these garages are not public and therefore can be secured, then the access points are the vulnerable points; perimeter exit stairs, lobby access, the ramp and overhead gate, the separation between residential and commercial or visitor parking.

4.1  Vulnerable Access Points

4.1.1  Perimeter Exit Stairs
4.1.2  Elevator Lobby/Exit Stairs
4.1.3  Commercial/Residential Parking Separation
4.1.4  Overhead Vehicle Gate

Figure 4 - Vulnerable Access Points
4.1.1 Perimeter Exit Stairs
Perimeter exit stairs from parking to the lane or street are the most common access point. When these are visible from the lane or street and therefore within the awareness space of people using the pathway while searching for targets, these stairs increase the likelihood of theft.
Possible Solutions:
Exit stairs should be located so they are not visible from the lane or street and, where possible, they should also be made visible to the residents of the building to increase watching by residents.

Figure 6 - Exit stairs can be better located so that unwanted access to the garage is minimized.

Door hardware should make unwanted access through the door as difficult as possible. This can be achieved by providing a heavy duty steel astragal the full length of the door and by deleting the door handle (if this door is not required for resident access). Where a door handle is necessary in high crime locations, heavy duty hardware should be used and a bonnet can be placed around the door handle. An alarm contact on the perimeter doors monitored by a resident or building manager can also be useful.

Figure 7 - A common retrofit of an exit door where access has been a problem.
4.1.2. Elevator Lobby/Exit Stairs
Access to residential buildings is easily gained through the front entrance door, either by following another person inside or by buzzing several occupants until someone allows access. Many existing apartment buildings have an exit stair leading from the lobby down to the underground parking lobby. This provides access into the parking where the easy targets, the cars and bicycles are located.

Possible Solutions:
It is important that building residents do not allow access. But once lobby access has been gained, access to the underground parking can be stopped by directing the exit from the parking garage directly outside with a solid door and astragal on the exterior door located adjacent to the building entrance.

![Figure 8](image.png)

4.1.3. Commercial/Residential Parking Separation

In mixed use facilities, access to residential parking is often gained through the fenced separation between commercial and residential.
Figure 9 - A retrofit of a minimal parking separation due to problems.
Possible Solutions:
Standard chainlink fence is relatively easy to cut through. A heavier duty barrier is suggested, such as concrete block fencing, steel reinforced chainlink, expanded steel mesh or aluminium or steel bars. The commercial parking should be secured during non-business hours with gating. Security patrols for the open commercial parking should be considered in high crime locations during business hours. Residential visitor parking should not be left open to the street, but should be gated with easy access by an enter phone on the driveway.

![Figure 10 - Separation between users can either be visibly open or solid.](image)

4.1.4. Overhead Vehicle Gate
Another common point where unwanted access is gained is through the overhead gate. This has been encouraged to be taken care of by programs such as “Wait for the Gate”. The timing for the gate to close can be set to approximately 8 seconds. Many building residents express satisfaction with parking where there are 2 gates resulting from visitor parking and/or commercial parking. Or where some residents have separate parking to a townhouse unit within the underground parking. A 2 gate system could be incorporated in higher crime areas where the first gate would have to close before the second gate would open. As well, the design of the ramp and the spaces outside the ramp can reduce opportunities for areas of concealment making access to the parking under the gate easier. The gate hardware is also important to ensure that the gate cant be activated or vandalised from the outside.

4.2 Location, Location, Location
It seems that most garages, at one time or another, will be hit with theft in almost any location and most security measures noted above should be used. However, knowing the crime context has impacts for keeping the opportunities low, for reducing the need for heavy locks and security measures and can save a lot of expense for building owners as a retrofit.
4.2.1. Neighbourhood Crime Rates
At the macro scale, most areas of Vancouver experience theft in residential parking facilities but some areas experience more than others. Areas adjacent to the Downtown Eastside, some Skytrain stations and the Central Broadway Corridor have higher levels.
Possible solutions: In medium and high crime neighbourhoods, extra care can be taken to watch for pathways and activity nodes and at vulnerable access points to the parking facility.

Possible Solutions: In medium and high crime neighbourhoods, extra care can be taken to watch for pathways and activity nodes and at vulnerable access points to the parking facility.
4.2.2. Adjacency to Pathways
Pathways can be vehicular, bicycle or pedestrian. The type of pathway will affect the type of crime depending on who is using the pathway. For example, a pedestrian pathway between a convenience store and a high school, in some areas, may experience graffiti, vandalism and minor theft. A road used by a drug addict to drive from home to daily activities may experience higher levels of theft. If the pathway is used by people that are searching for targets, whether on the drive to work, or on the walk to school, it will put that area surrounding the pathway into the “awareness space” of those people and therefore at a higher risk. Many pathways are not used by people that are searching for targets and therefore do not have any significant crime.

Possible Solutions; Vulnerable access points should be kept away from pathways. Increased security measures should be taken when near to an activity node that attracts, facilitates or generates crime. In this example, the parking location could be relocated so that it wasn’t easier to walk through it than around it. A proper pathway around the site could be developed rather than fencing the site off. The entrance to the visitor parking could be gated, thereby using a double gating system. Perimeter exit stairs could be located away from the pathway so that non-residents would be unaware of its location.
4.2.3. Adjacency to Activity Nodes
Activity nodes are places that, by their use, can increase crime depending on who the users are. Some activities generate crime by their use such as a neighbourhood where there is high levels of drug abuse. Some activities attract crime such as some large shopping parkades can attract car theft. Still other activities can facilitate crime such as transportation systems that allow anonymous access and exit and therefore increased crime to surrounding areas.
Possible Solutions; Locate away from pathways ie the main driveway entrance to the mall, locate driveway to the underground parking away from that location if possible. Don’t encourage cut throughs on site. If a cut through is necessary, locate vulnerable access points away from the view of non-residents and with view of residents.

5 Theft by Residents

It is unusual that theft in underground parking is the result of residents of the building. However, this does occur never the less.
APPENDIX A - Crime in Residential Parking

Although crime is a rare event, in residential parking facilities, it is fairly common to the extent that many residents will have experienced a theft themselves or personally know other residents that have. The most prevalent type of crime is theft from auto (TFA), but theft of auto (TOA) is also common. Mischief is reported where a car has been broken into but nothing was stolen or can also be vandalism. Violent crime is very low in these facilities showing 13 assaults, 2 robberies and no homicide.

The following crime statistics are reported crime to the Vancouver Police Department so some types of crime, particularly some types of assault such as sexual assault and bicycle theft are likely under-reported.

In residential parking facilities, the actual risk of the thing that people fear most; random violent attack, is rare. As an example, over the year of 1997, there were 7 reported incidence of assault in residential parking facilities in all of Vancouver and none of these were sexual assault. It should also be noted that none of the parking facilities were secured with gates. The reasons for the assaults as follows;
4 - disagreement and pushing between residents of the residential building or acquaintances,
2 - one where a resident was pushed after catching a suspect stealing from the car, one where a security guard had a needle flashed when apprehending someone stealing from a car,
1 - resident pushed down by unknown person.

City Wide
Assaults In Apartment Parking Lots

Figure 14 - Location of Assaults in Apartment Parking in 1997

This shows that residential parking is generally safe from random violent attack. It also shows that a well secured parking facility will reduce opportunities for assault associated with theft.
In 1997, there were 3,549 reports of theft from cars. This is significantly more than any other type of crime. Theft from auto is likely well reported since most people will report a break in and theft from their cars for insurance coverage.

![Map of Vancouver showing the location of theft from auto in apartment parking lots in 1997.](Q:\public\mary\beth\parking_guideline1.wpd)

Figure 15 - Location of Theft From Auto in Apartment Parking in 1997
APPENDIX C

EXAMPLE OF MEDIA ON URBAN CRIME PATTERNS
Police Beat: Naples, Collier County

Thursday, April 20, 2000

Daily News

COLLIER SHERIFF

North Naples attack

Two people were reportedly attacked in their North Naples apartment Tuesday night after two others came into their home and struck them with a pipe.

The incident happened at the Turtle Creek apartments, reports say.

Sex assault reported

A 33-year-old woman reported that she was sexually assaulted by two men off Davis Boulevard in East Naples early Tuesday morning.

The woman, whose name is not being used because of the nature of the crime, reported that the assault happened around 1 a.m. Tuesday, deputies say.

She told officers that she was looking for her runaway daughter in Golden Gate when she met two men in a red Toyota who offered to help her. Reports say she got into the car with them and they attacked her.

Burglaries and thefts

- 600 block of 102nd Avenue North, North Naples. Stolen Monday or Tuesday: A wallet from Melanie Waterhouse's vehicle.

- 1800 block of Mission Drive, North Naples. Stolen Monday or Tuesday: $20 from the glove box of Lori Burris's vehicle.
Tuesday: $20 from the glove box of Lori Tatum's vehicle.

- 3400 block of Radio Road, East Naples. Stolen Tuesday: A purse from Evelyn Hoover's vehicle.

DUI arrests

- Joseph A. Giofrida, 20, of 3840 31st St. S.W., Golden Gate, was arrested Wednesday by Naples police on U.S. 41 North.

- Sandra Lavonne Lee, 33, of Fort Myers, was arrested Wednesday by Naples police on Goodlette-Frank Road.

- Alfred Diaz, 45, of 2648 Van Buren Ave., East Naples, was arrested Wednesday by deputies on Lunar Street.

To report a crime or any suspicious activity in your neighborhood, call the Naples Police and Emergency Services Department at 434-4846 or the Collier County Sheriff's Office at 774-4434.

Police Beat is compiled and written by the Naples Daily News staff from oral and written reports by Naples police, the Collier Sheriff's Office and other agencies. Arrests indicate suspicion of crime, not guilt.

Get the scoop on what's going on in Naples. Just click here to listen in on our live police scanner. The frequencies being scanned bring in the main dispatch of City of Naples police and fire units, as well as the Collier County fire system.

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04/20/2000
APPENDIX D

SITUATIONAL CRIME ANALYSIS
(BRANTINGHAM METHOD)
Appendix

Situational Crime Analysis (Brantingham Method).

The following is the objective of the analysis process;
Establish
• high risk populations
• pathways
• activity nodes
with the intent of developing a “Crime Picture” of the neighbourhood

Crime Statistics Analysis
The object is to identify types of Crime surrounding the site; who is doing it, how and when
• Get Statistics from Police on crime activity
  • Geographic 911 Calls for Service maps - show raw amounts of calls which usually shows problem areas but doesn’t show what types of problems
  • Geographic Reported Crime Contour Maps and Pin Maps - show categories of crime and request different scales ie. city wide or .5km radius

Crimes to Property
  Theft from Auto
  Theft of Auto
  Commercial Break and Enter (Burglary)
  Residential Break and Enter (Burglary)
  Mischief

Crimes to Person
  Robbery (Mugging)
  Assault (including sexual assault)
  Homicide (including attempted homicide)

Other
  Drug Offences
  Sex Trade or Prostitution Offences

• Temporal Analysis of Crime (time of day, day of the week, time of the year)
• Get Police Reports to establish the detailed nature of the crimes (only for small samples)

• Keep in mind the weaknesses of reported crime
• Some types of crime are highly under-reported ie. bicycle theft and sexual assault
• Reported crime is subject to changes in police reporting techniques
• Some minor crimes cause high degrees of neighbourhood concern but police are not called ie. graffiti

• Interview patrol officers for the area
“Ride Along” with the police in the district if possible

Site Analysis
The object is to study the site numerous times, at different times of the day, week and year if possible to assist in the development of a crime picture of the neighbourhood.
- Consider the site at Macro, meso(middle) and micro levels
- Look for evidence of pathways
- Look for activity nodes
- Look for debris ie. needle caps, wrappers and needles, condoms
- Bars on windows
- Night lighting
- Prospect and Refuge
- Character of the neighbourhood ie. old but with a lot of personal touches and caring
- Maintenance levels
- Graffiti and graffiti removal programs
- Look for potential watchers or guardians

People watch

Use Analysis
The object is to search for activity nodes that attractor, facilitate or generate crime. The uses listed below are often **but not always** associated with different types of crime. A few examples;
- schools
- convenience stores
- liquor establishments
- fast food outlets
- coffee houses
- shopping malls
- youth homes
- drug houses
- methadone dispensary (drugstore)
- homes of the high risk populations
- parks
- social housing
Consider future changes

Pathway Analysis
The object is to identify pathways on and surrounding the site. Some of these pathways may carry high risk populations and some may carry vulnerable populations.
business routes and transfer loops
- skytrain stations
• traffic arterials
• pedestrian pathways
Consider future pathways

Neighbourhood Consultation
The neighbours generally have a strong sense of the crime that is happening in the area and may already have ideas on solutions.
informal interviews during site inspections
contact neighbourhood groups and associations particularly crime prevention offices

Demographic Review
The object is to identify population characteristics that impact crime ie high risk or vulnerable populations. Some populations such as seniors have higher levels of fear of crime.
• Choose a census tract or enumeration area for the site and analyse
• income
• household make-up ie. lone parent families
• owned versus rented dwelling
• low income housing
• population increase
• gender
• age
APPENDIX E

EXAMPLE OF VANCOUVER POLICE DEPARTMENT CRIME MAP