The Effect of Green Space Design in the Margins of Intra City Highways on Increase of Safety (Case study: Niayesh Highway, Tehran)

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Abstract

One of the most important elements of desirable quality in man's life is the issue of "Life Environment Safety" and safeness of people from threats, pollutions and abnormalities in the life environment. Safety need is always one of the most fundamental needs of man and he cannot have a desirable perception of the spaces in which he lives as long as this need has not been satisfied. Newman (1971) developed the theory of defendable space and examined the effect of space elements on mass and sense of safety. He mentions the factors affecting insecurity feeling and offers procedures in this regard by emphasizing on the structural and social elements. The theory of defendable space is based on this theory that life quality can be improved through decreasing criminal opportunities by appropriate architectural design and correct use of urban dwellings and environment. Based on the findings of this research, design of green spaces in the margins of highways should be such that it is not changed into a gap or inefficient space and it controls to a high extent the environmental pollutions and increase of social safety by use of plants, bushes and trees and in general, it can induce a positive image of environment to other people. The present research deals with the problem of addicts in the green space in the margin of Niayesh highway who have caused insecurity and increase of accidents within the interval of Yadegar Emam highway until the exit way of Saadatabad Street. In this paper, one can finds the necessity of appropriate design of defendable spaces for fulfillment of safety and improvement of urban life quality. Finally, functional and low cost strategies are proposed for control of noise pollution, air pollution, and decrease of accidents and increase of social safety in the green spaces on the margins of intra city highways.

Keywords: Safety, Newman Theory, Defendable Space, Green Space, Intra City Highway.
Introduction

In today's society because of, safeness of people from the risks and threats of the living environment is one of the basic human needs, it’s necessary that Human pay special attention to this issue. Margins of highways are one of the places that is necessary provide its safety, until its surrounding urban spaces can be responsive. Based on this research, it is tried by identify and investigate the factors of security and finding safe and unsafe urban spaces in intra city highways (Niayesh highway), find a solution for this issue.

Issue and also because of margin of highway is a residential local persuade us in order to secure the humans on the highway. Because, the lack of attention to margin of the highway and lighting and visibility to margin and also, the lack of attention to physical features of provide security has been causing fear in this area. In this regard, green space designing and visual monitoring on margin of the highway and construction of ambulatory police, are other ideas in this plan to increase the safety and utilization amount of spaces in margin of the highway.

Problem statement

One of the most fundamental problems of our modern societies are threats and dangers that affect the daily life of citizens in urban areas. This becomes problematic when people in space of their daily life means, in their residence place face with behaviors which cause the lack of security in areas that would have been comfortable in them and use freely themselves and their families from those spaces. So the issue of security and sense of security in all urban areas and especially in open spaces of residential neighborhoods have a particular importance. So in this research tried by identify and investigate the reasons of security and finding safe and unsafe urban spaces in residential neighborhoods, find a solution to this issue.

Aims

Recognizing effective factors in qualitative promotion of safety and reducing crime by using appropriate principles in green spaces designing of intra city highways.

Security Concept

Human security means immunity from any aggression and injury that threatens him and his privacy. This threat may be belong to the body, spirit or anything that belongs to him. Security can be investigate from different viewpoints such as economic security, social security, job security and personal safety. Certainly shortage and lack of each of these items will be create a sense of insecurity and has been consider as a threat to human life. Thus, the concept of security in a wide range of areas of human presence is meaningful. Thus, the concept of security in a wide range of human areas attend meaningfully.

Community Safety

One of the qualitative aspects of human life in which people, individuals and communities sufficiently were protected from real or hypothetical different risks, or are able to cope with the consequences of those risks. If lonely not able to cope with risks will help to them in this case (Honarvar, 2010, 2).
Crime prevention through environmental design

The core of this approach of the physical environment design can be used to create behavioral effects that cause reducing the incidents and the fear of crime and thus improving the quality of life. These behavioral effects can success to reduce the tendency of the physical environment in support of the criminal behaviors (Honarvar, 2010, 91).

Principles of crime prevention

The causes of crime are complex. In short, a criminal event occurs when an offender, a prone position, stimulating and created their occurrence factors or be faced with. This position is the creator of suitable aim in desired environment, in the absence of those who may hinder crime and also include those who tempt criminal act (Honarvar, 2010, 4).

Crime prevention, including methods of preventing, weaken or any of the mentioned items in order to reduce risks of criminal incidence or its severity and strength (same).

Features sustainable communities in crime prevention

1. Access and movement:
   Places that appropriate design of entries, directions and spaces provide suitable move without security disorders.

2. Structure:
   Places that has a different build in order to avoid anomalies.

3. Supervision: Places where all of their public spaces are available and under public supervision

4. Physical protection: Places which have appropriate security indicators and designed well.

5. Activity: Places where human activity be in harmony with location and to reduce crime, these places are creator of security sense at all times.

6. Management and Maintenance: Places where has been designed with science of management and maintenance. These places mentally causes don’t encourage crime now and in the future (Honarvar, 2010, 4).

Defensible Space

Public or semi-public spaces that monitored, maintained by any person and has boundaries actually are defensible. Defensible spaces derived from Oscar Newman's study and research in 1973 under the same title and with a strong concept in the field of public safety creation in urban areas. Defensible space also is dependent on escape routes and amount of anonymity sense and unknowability of the users from the space (Honarvar, 2010, 92).
Defensible space theory

Defensible space theory discuss about a range of mechanisms which includes real and symbolic barriers, sturdy and clear defined of affected areas and improvement of supervision opportunities, that together can controlled environment by residents. The purpose of this theory is providing space security. Defensible space theory criticize of the large buildings which make it impossible to identify strangers and has created a lot of unsupervised access. Newman’s research has identified how poor supervision can lead to the ease of committing a crime without attracting attention. And how the availability of escape routes, make it easier for criminals escape from the crime scene (Honarvar, 2010, 93).

Figure 1 Oscar Newman's defensible space model.

Natural surveillance (or supervision)

Prevention of committing crimes and possible errors by the presence of pedestrians or public visibility of the windows of nearby buildings. These supervision is also commonly used as inactive supervisor "Watchmen" (same, 94).

The importance and how to influence green space on urban climatology

Today, landscaping and especially architectural and design of green spaces is considered as part of urbanism. From this perspective, these spaces has opened their place in highway design and user separation and other urban design.
During the day, the leaves of trees and shrubs, causing evaporation of water vapor in the surrounding air. This increases the relative humidity of the air and on the other hand, cooling the air of surrounding green space. For converting water to steam 600-580 calories heat is needed between, that obtained from solar energy. That's why during the sun is shining, surrounding air of the trees is cooler than the space without trees (Saeidnia, 2004, 37-36).

The amount of energy that absorbed and converted into heat, 60 to 75 percent is spent on Trespiration action. Thus, can be sure, in an area where no vegetation cover and the soil surface covered with a variety of buildings, a large part of solar radiation energy reflect and by different ways provide environment warmth (same).

**Street green spaces**

Street green spaces, including squares green spaces, margin of highways, margins of sidewalks, central islands, non-coplanar intersections, and middle bands of the way (Refuse) and next to the streets. Street green spaces, are a part of building access networks that have functions of ecological, social, traffic immunization and beautification of urban spaces.

Ecological performance of street green spaces have an important role. This type of urban green spaces can be effective in reducing audio pollution and air pollution and In terms of social function, linear green spaces, desirability of walking paths and attracts people to walk.

As well as street green spaces which are considered as a factor for traffic segregation and segregation of 12 walking paths and motorized are used by traffic and urbanism engineering, play very valuable role in immunization of crossings. Furthermore, street green spaces, by diversifying the physical building of access networks, urban spaces, bring beauty and special effects (Saeidnia, 2004, 57-56).

**The Juniper (tree)**

This tree is resistant against air pollution. Beauty of trees especially after flowering due to color differences of leaves with flowers and fruit one of its characteristic. Its main use is for single tree or rows (Saeidnia, 2004, 69).

**Shrubs and cover plants**

These plants are often short and grow rapid and their maximum length is one meter. In some varieties of cover plants has been observed that in a very short time, occupy the soil surface that due to their greens or short create special beauty. Usually this type of plants is not very demanding to food and does not require a lot of water. Some of them also are resistant against soil salinity, like Frankynya, some others in poor and sandy soils, such as Santralya, thrive well (Hekmati, 1990, 486-484).

**Suitable species for air pollution**

Names of resistant species and good trees against air pollution include:

1. The Juniper (Ailanthus allissina)
2. silk tree red genealogical night(Albizia Julibrissin)
3. Hackberry trees (Celtis australis)
4. The ginkgo tree (Gims biloba)
5. White magnolia tree (Magnolia grandiflora)

**Selection of plant species consistent with the climate and soil of Tehran**

Tehran is located in the dry steppe zone of slopes of the Alborz Mountains and circadian and seasonal temperature difference is relatively large. On the other hand its humidity and rainfall is little and in different seasons is erratic. Naturally such climate situation require within the city, will be planted trees that at the same time with beauty and vegetables, tolerate range of temperature and humidity and does not require a lot of water (Tabatabai, 1992, 108).

**Preservation and expansion law of green spaces in cities**

Clause 4 of Article 4: planting and cropping Irrigating trees, streets, squares, highways and public parks municipality's duties.

Functions and factors of shaping urban space without defense

Urban spaces without defense generally are shaped by three factors:

**A. Lack of compatibility among form, function and meaning**

The most important factor of shaping urban spaces without defense, is lack of compatibility among form and function and meaning. Creating harmony among form and function, is easier than giving Identity and meaning to urban spaces.

**B. Spaces without function or a periodic function**

Spaces with intermittent function and at times of the day or season or year convert to dead spaces.

**C. Lack of visual sightings**

Missing spaces, given names, are spaces according to physical reasons considered as places out of sight. Visual sightings was not possible due to the lack of light and don’t apparent the form due to darkness, is the first step toward creating space without defense (Taherkhani, 2002, 94).

**Crime prevention by environmental design**

One of the first theorist of crime prevention by environmental design (CPTED) is Jeffrey that starter of a new era in criminology ideas that, focuses on the circumstances surrounding crime and offender factor, so CPTED can be considered as the second generation of environmental theorists, that in crime prevention models attempting to integrate social and cultural variables and argued realistic hypothesis about the behaviors of ownership and territory. In the meantime, a committee is composed of sociologists, urban planners, criminologists paying the price by the us company Westinghouse, did a research about the changes on the physical and social environment based on respect to four underlying principles began the crime prevention:
Care and supervision: creating suitable physical conditions for users of the urban space so that increased their ability to view criminals and annoying and suspicious people. This will prevent accidents or crimes that are happening, the presence of citizens in urban areas: encouraging citizens to make the most usage of the created spaces so that reduce the environmental vulnerability against crime.

Access control: to prevent the entry of suspicious or disturb persons which increase the risk of crime, use of physical barriers (such as walls, fences, or herbal bushes, locks, paint, etc.) and if possible, have changed the design of pavement and sidewalks and building entrances.

Provocative factor: all factors that encourage criminals to commit the crime, such as easy access to high profits and lack of arrest risk i.e. must be destroyed.

The relationship between permeability and accessibility by reducing crime

Permeability of any system of public spaces dependent on the number of potential ways to cross from one point to another considered point. Both physical and visual permeability depends on how network of public spaces classify surrounding. Blocks are areas of land that are completely surrounded by the streets. There are more permeable in small blocks compared to larger blocks. Because they promote the visual permeability (A.Yen Bentley, 2003).

Permeability is one of the most important urban design criteria permeability caused by the pattern of streets. Permeability means a measure that is indicative of morphological features of access, that environment allows to a person for route selection through the way and also within the way.

One way to enhance security in an environment is reducing the permeability. This usually can be accomplished using a hierarchical system.

Oscar Newman has proposed hypothesis to improve this mechanism by increasing the control of local territory of individual and communities life. Increase of crime and its distribution in the urban environment, concerned urban residents increasingly into the security of living in large cities and densely populated.

Reviews of case study

Niayesh highway is one of Tehran’s highways that Vali Asr Avenue from the west and in the south of mellat garden started in north central Tehran and is drawn to the west of Tehran. The highway on its way have intersections with Chamran Highway, Yadegare Emam highway and Ashrafi Esfahani highway (fa.wikipedia.org).
Figure 1: target site on Tehran’s Niayesh highway (Source: Google Earth software)

According to a highway in urban conducted studies and field observations have been involved in this issue, to Niayesh Highway between Yadegar Imam highways until exit of Saadat Abad Street, which is the chosen range in this study. There are many Buxus and is also compressed, has been a local for addicted community. Whether socially or in terms of visual and most importantly in terms of accident causing many problems for the citizens. As in images and repeated field perceptions is clear, at highway’s mild bar in chat and in the city defensible space that created through the false design of green space, has become a place for sale and consumption of drugs and addicts of city west. Defensible space is considered as the major threat in terms of security in the area and increased crime in studied range. Also, hypes who cross of Highway and guard rail to reach the mild bar, increased accidents statistics of automobile with pedestrian extremely and even, sometimes drop themselves purposely on front of an automobile and causing an accident and finally due to receive damage from the unaware driver. While with suitable design of environment and green space in this site, it can be reduce the crime, accidents and control of air and voice contamination in the mentioned range.

Figure 2: addicts attendant between Buxus and guard rails of Niayesh highway
Significant point in designs

- Creating the mild bar play an important role in the wide street, and it can improve space efficiency. But it must be careful in the design of street space, while maintaining the integrity and its unity divided, but not sliced. It is better visually, this division by imping trees in the middle of the bar (if possible by imping trees in two side of the runway space roadway) created character of a tree-lined street.

- Instead of Buxus can be used bushes and other plants between the guard rail and mild bar of highway separator. Such as oleander bushes.

- Even if is used Buxus, it can be planted in an oblique until don’t create a space to chat or urban defensible space and in this way greatly can prevent crime and accidents on urban highways. To control the air contamination in the mentioned site, can be used from Juniper (Ailanthus alissina), night silk tree of red lineage (Albizzia Julibrissin), hackberry tree (Celis avstrulis), Zhingo tree (Gimcy biloba), white magnolia tree (Magholia grandiflota) and mulberry (Morus Alba).

- With proper design of green space (so that plants and trees not obstruct vision and supervision) and the adherence to the principles and standards of plants on interurban highways as well as control and monitoring related organization, can greatly hope to solve the problem.

Figure 3: planting green space of highway’s mild bar obliquely (Source: authors)
References


3- http://architect.nemoneh.com/plan_criteria_of_highway_improvement_and_renovation


6- Karimipoor, Ali, dissertation of” identifying of affecting factors on safety sense in city spaces according to defensible spaces”, Azad University of central Tehran.


8- Saeednia, Ahmad, “Green Space of City”, organization publication of country’s municipalities and Dehyariha, ninth volume, 2004.


12- Taherkhani, Habibolla, article of “creating defensible city spaces”, city management quarterly, No 9, spring 2002.